

In This Issue—*The Service Manager As a Semi-Engineer*

Engineering
Library

MOTOR AGE

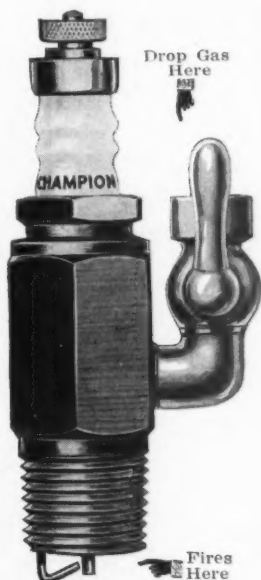
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Vol. XL
Number 23

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, DECEMBER 8, 1921

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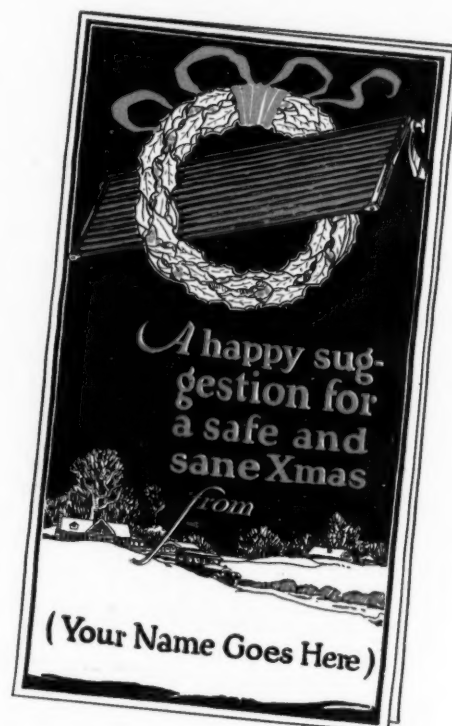
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Dealer's name

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How many?

MOTOR AGE

Published Every Thursday by
THE CLASS JOURNAL COMPANY
 MALLERS BUILDING
 59 East Madison Street, CHICAGO

Vol. XL

December 8, 1921

No. 23

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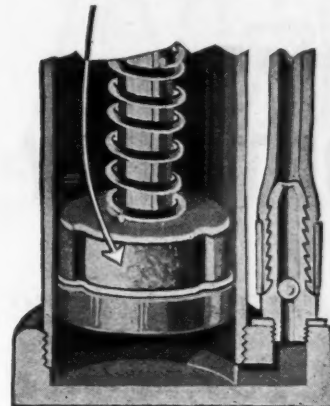
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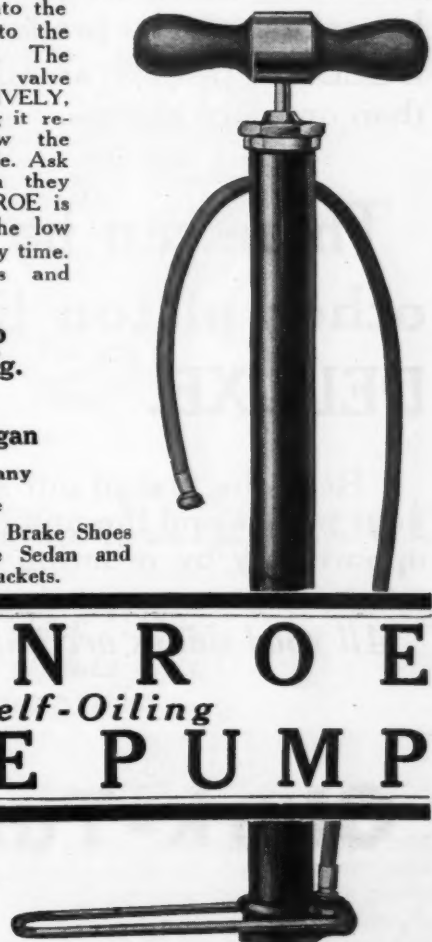
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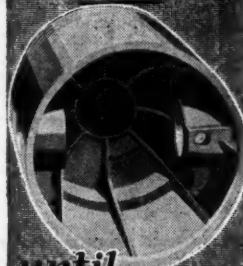
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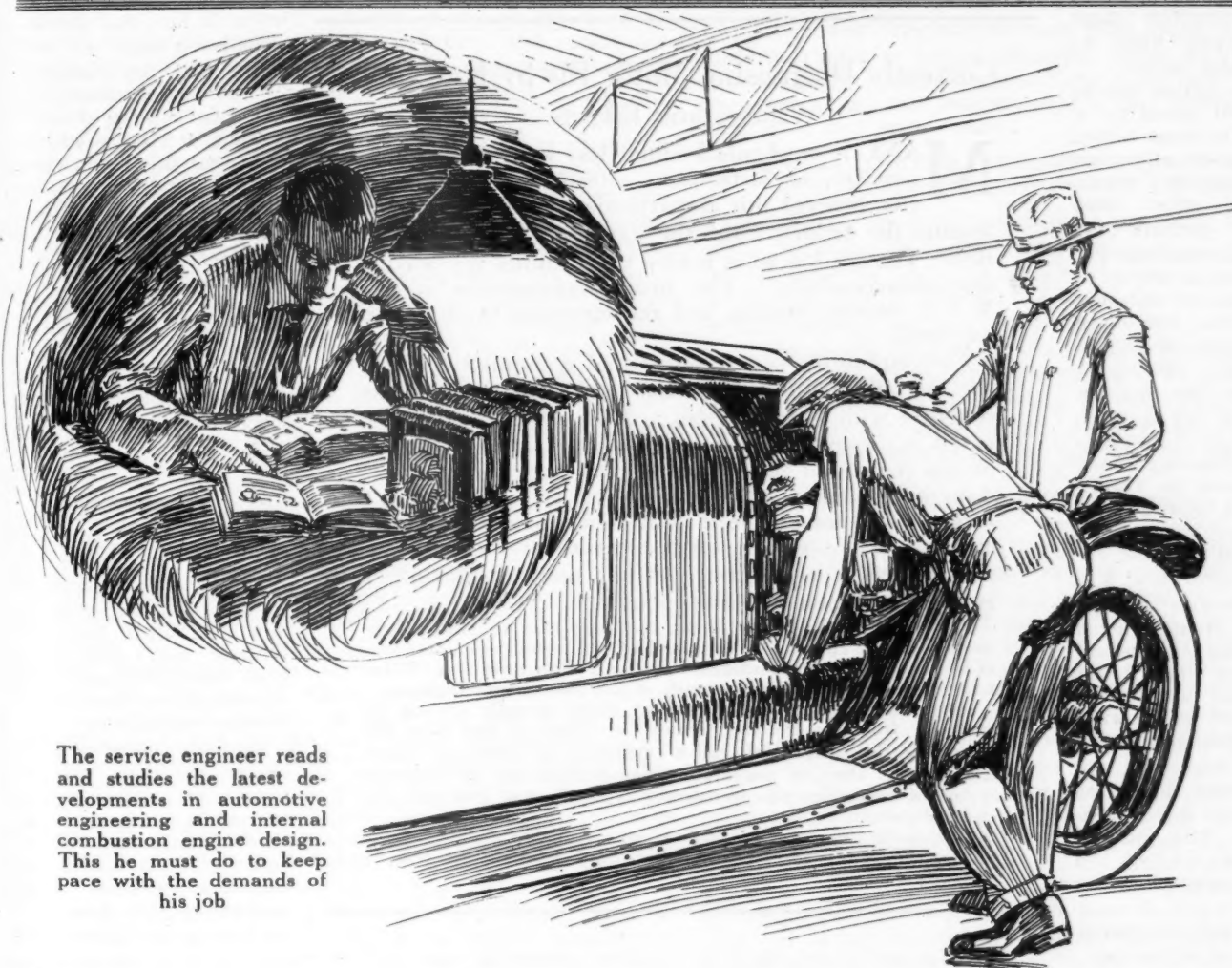
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THE FIRST OF A SERIES

MOTOR AGE



The service engineer reads and studies the latest developments in automotive engineering and internal combustion engine design. This he must do to keep pace with the demands of his job

The Service Manager As a Semi-Engineer

The Continuous Evolution of Service Tends to a Higher Level of Efficiency—Good Business Methods Will Demand a Knowledge Acquired Only by Study

By B. M. IKERT

IF we are going to handle the service work on automotive vehicles on anything like an efficient basis in the next few years, it is going to be someone's job in most maintenance divisions of the dealer's business to be what we might call a semi-engineer.

One of the greatest faults in modern service work is the fact that so-called "trouble shooters" do not know enough about the underlying principles which govern the proper operation of an internal combustion engine under varying conditions, and they cannot, therefore,

always suggest the immediate remedy when some peculiar trouble manifests itself.

There are too many in this service business who do not understand the importance of engine temperatures, the finer points of valve timing and its relation to volumetric efficiency, the theory of gas flow in manifolds, the reason why old engines do not handle present day fuels efficiently, and why and when to use mineral oil on anti-friction bearings and the necessity of cleaning out and refilling the gearset and differential, the same as is done with the crankcase.

Let a car come into the service station with a smoking engine. Immediately some mechanic says, "She's pumping oil. Gotta fit new pistons and rings and maybe true up the bores." Another says "She's worn down, better use a heavier oil." Same old stuff we heard around automobile shops ten years ago, when we believed those things.

A service station may be ever so well toolled up, it may have the finest lathes, arbor presses, alignment devices, electric - driven drills and other such things to perform the necessary mechanical operations encountered in the servicing of an automotive vehicle, but much of the work thus performed will count for little unless the man doing the job, or, at least, the foreman possesses enough engineering knowledge to know the reason why certain things must be done a certain way.

Possession of some engineering knowledge will help the service man in diagnosing trouble much more readily. Suppose, for instance, that a car comes into the service station and the owner complains that the engine overheats most of the time and that the water in the radiator and jackets boils easily. The ordinary service man might go after the job something like this.

He will ask the owner what kind of oil he uses, look at the fan belt to see that it is tight, feel the core of the radiator for cool spots indicating clogged passages, examine the hose connections and perform a few more of the more common operations incident to trouble of this kind. Even after he has done all this, replaced old hose connections with new ones, tightened the fan belt, flushed out the radiator, etc., the engine still might continue to overheat. It may be an engine in an older model car, which fact makes the job all the more difficult.

SERVICE ENGINEER HAS THOROUGH TECHNICAL BACKGROUND

Now, what would a man do if he were somewhat of an engineer and understood some of the things which govern the cooling of an engine? Perhaps he would go about the job something like this. He would, of course, do the more common things as mentioned above, but after checking up on these, he would go further into making an analysis of the situation. He would study the type of cooling system, thermo-syphon or pump. Then he would study the type and size of fittings used on the radiator—that is, the inlet and outlet pipes. Maybe the owner of this car at one time had a radiator of another make put on the car and certain essentials were not taken into consideration when the change in radiators was made. The old

radiator might have had an expansion tank at the top of the radiator, while the present one has none.

With pump circulation this might mean that the pump delivers water so fast to the system that it backs up in the top tank of the radiator. Bubbles collect there and the water does not flow down the passages of the radiator, but rather seeks an outlet through the overflow pipe. Also, new fittings might have been soldered to the top and bottom tanks, which are not of sufficient diameter to handle the flow of water. Now, the service man with engineering knowledge will know that engines using the pump system of circulation require fittings one inch in diameter for engines up to 40 hp. and 1¼ in for engines up to about 60 hp. He also will know that trucks or tractors using the pump system will need fittings 1½ in. in diameter for engines from 40 to 60 hp. For thermo-syphon systems he will know that the diameters of the fittings should be about twice those given.

Thus, it readily will be seen that this man, whom we might call the service-engineer has a much better background on which to shoot trouble than the man possessing only mechanical skill or meager knowledge of the internal combustion engine.

Take another case, that of anti-friction bearings, such as used in the front and rear wheels, gearsets, etc. The average service station employe knows little more about these bearings other than that they are used in automotive vehicles and that they have to be replaced every now and then in some owner's car. But what does this service-engineer of ours know about anti-friction bearings?

He knows these things: he knows that a well-made and installed ball bearing will not wear out in the same sense of the terms as we are accustomed to think of it applied to plain bearings.

He knows that if there is a great amount of side play or radial play in a ball bearing that this has been caused by some foreign substance getting into the bearing, or through overload. He knows that metal particles often become dislodged from the interior surfaces of differential and transmission housings and find their way into the bearings.

Owners who are careless about shifting gears literally grind off metallic particles from the teeth of the gears and these particles are picked up very often by the lubricant and become lodged in the bearings, causing rapid destruction. Thus the service-engineer, who realizes that the bearing has been properly installed in the first place at the factory, is able to trace trouble of this kind to the human element. It makes a far bigger hit in the service station to tell an owner that the reason a bearing went bad was because he did not shift gears properly, than it does to tell him,—"They're not putting very good stuff into these bearings, etc."

Our service-engineer knows that to lubricate anti-friction bearings only pure mineral oils or greases must be used, because any other lubricant which shows a trace of alkali, or which becomes rancid, will eat away the highly finished surfaces of the races and steel balls and cause them to become rough, after which they are of little value as bearings.

Correctly Diagnosing Motor Ills by Knowing Causes and Effects

MANY a mechanical clinic has been held unofficially. In institutions catering to automobiles in general this is particularly true. Gathered around the invalid, stand the star men of the organization. The car has been before these clinics repeatedly, but unsuccessfully. The head diagnostician at the X Y Z Service Station had recommended a thorough overhaul.

Uncomplainingly the owner had consented to have his pet thoroughly dissected and its vital organs replaced with the new ones. The operation was executed in a workmanlike manner, the actual replacing of the parts and the fittings of the bearings, etc., was done competently. The car was of an old vintage, a leader in its day and well built, and the constant pride and joy of its owner. But the expensive overhaul had not revived its old charms. It had not the smoothness and vigor of manner of its youth.

The X Y Z head diagnostician had seen that his efforts were not a real cure and had given up. Then followed the monotonous visits to the various maintenance stations. The town was of that size where each man knows much of the other man's business.

In the last scene we see the happy owner proudly driving his car away from the DeLuxe Service Co. There it had been discussed by the staff, which had a reputation for knowing Causes and Effects. They, in consultation, had decided that the digestive system of the engine was accustomed to the food of 1908 that was easily digested.

This easily vaporized gas was not now available. Knowing the Cause and having observed the Effect, they supplied the remedy and witnessed the Revelation.

The service man possessing semi-engineering knowledge will understand the importance of proper heat application to present day fuel, in order that engines, especially the older models, may perform to better advantage and minimize crank-case oil dilution.

The service engineer is not so ready to tell the car owner he needs a new carbureter, because he has learned that old model carbureters often can be made to perform equally as well as new instruments, if certain work is done on the fuel feed system which insures more heat getting to the fuel.

SERVICE ENGINEER ENLIGHTENS CUSTOMER ON TECHNICALITIES

He will be able to explain to a car owner that poor fuel economy, fouled plugs, jerky action of the engine at slow speeds, is due in many cases to improper and incomplete vaporization of the heavy fuel. The man who does not know will suspect worn pistons and cylinders, poor plugs, etc. But the service engineer who knows about condensation in long manifolds, etc., is in a far better position to suggest a remedy for an ailing engine than the ordinary mechanic.

To recall an incident. A six-cylinder car was driven into a service station not long ago with the engine operating rather badly. The car was of 1917 vintage and the owner said he thought the engine needed new pistons and rings, the bearings taken up, perhaps new valve guides, and a number of other things. He said the plugs would get dirty about every 500 miles; there was a variety of knocks in the engine, fuel mileage was poor and the car would not throttle down very well. He liked the car, he said, and would like to keep on driving it, but did not want to spend a great deal of money in having the engine "overhauled," which he thought was necessary.

Under ordinary circumstances a service man might have told this owner that his engine probably needed new pistons and rings, reground or rebored cylinders, new bearings, etc. They could not tell exactly until they got the engine down, etc. The owner would likely answer that they go ahead and tear the engine down and replace whatever parts needed replacing. What he wanted was that smooth operation which he had experienced in the engine when it was new.

Well, what happened? The man in charge of the service was enough of an engineer to know that this engine was a well designed and built job, and would perform well in the days when it was brought out. But he knew also that the fuel has changed, and therefore forgot for the time being such items as worn parts and directed his attentions to the fuel system. He knew that to replace worn parts only would not get at the real seat of the trouble.

He therefore installed on this engine an exhaust heated device or "hot-spot" to catch the raw fuel coming from the carbureter. After that he adjusted the valves, cleaned the plugs, adjusted the carbureter and set the ignition points correctly. As if by magic, the engine was a different running job. The jerky action had disappeared, idling was better, as was also acceleration. There was a wrist pin knock audible in the engine, but one which easily could be tolerated.

The owner of the car was actually amazed by the change in the engine operation. He could not comprehend that the installation of a device costing under \$20 had made all this difference. He had imagined that the engine had been gone over from top to bottom and was prepared for a bill running a hundred dollars are maybe two hundred dollars.

It is not difficult to see how an owner like this man becomes sold on that service station. The service engineer had made the correct diagnosis; he had applied his knowledge of fuel vaporization and its effect on engine operation to a degree not customarily done by the ordinary service station employee. He was frank with the customer and told him that even better results would be had if the wrist pins were renewed, the bearings tightened and a few minor parts replaced.

His honesty had gained for him the confidence of the owner, who immediately suggested the shop doing those things which the service engineer deemed advisable. Thus, the shop cashed in additionally on this work, brought about first by selling the owner on the fact that here was a shop wherein the men knew what they were doing.

THE REAL SERVICE ENGINEER STUDIES LATEST ENGINEERING PRACTICES AND THEORIES

The ordinary mechanic has a lot to say about this or that engine "pumping oil." The average mechanic is not a diagnostician and he seeks the easiest way out of it. But "oil pumping" is looked upon in an entirely different light by our service engineer.

The service engineer knows that for one thing a misfiring spark plug will cause "oil pumping." Just as soon as spark plugs get fouled with oil, the none too well versed mechanic complains of "oil pumping" and probably puts in an order for new pistons and rings as his temperament may direct at the time.

Now the service engineer knows that something wrong with the ignition system is one of the most prolific sources of so-called "oil pumping." He knows that if an engine is in good condition so far as compression and rings are concerned, there must be a certain amount of oil on the cylinder walls for lubrication. But, just the minute the spark plug misses fire, this oil is not going to be burned up, because there is not enough heat in the cylinder under such conditions. Therefore the oil collects around the piston head and combustion chamber and soon gets on the plug itself.

So we say again that the service engineer who has studied these things knows where to look for the seat of trouble, in order that he might give a correct diagnosis of the trouble to the owner of the car.

The service engineer is a thinking man. He reads and studies. He acquaints himself with the latest theories regarding the performance of internal combustion engines. He does not only know how a certain job must be done, but knows why. He is not expected to know anything about cotangents or moments of inertia and such things with which the out-and-out engineers have to cope. But the more he does know about the common things in engineering so far as they can be applied to his art, the better will be the work his shop service station turns out. He is the coming man in service.

Where the Printed Word Excels the Salesman's Oral Argument

DEALERS will find a scrapbook containing newspaper clippings and owner testimonials of assistance to them in selling cars, especially if they place it carelessly around in reach of the prospect where he may come upon it when at leisure.

As a convincing argument in his closing sales talk, Holmes Simons, president of the Columbia Automotive Trade Assn., Columbia, S. C., uses his scrapbook with good results.

This book contains newspaper clip-

pings and advertisements which deal with the car he handles, as well as facts tersely related, and have that power to convince which the printed word carries in excess to the spoken. One of the advertisements which appears in his scrapbook gives the names and addresses of a number of men and women who have purchased the car Mr. Simons handles, and he always urges his prospects to call up these purchasers so that they may hear expressions from owners of cars.

"I have found this scrapbook of gen-

uine help to me," Simons says. "When a prospect is getting tired of hearing me talk, and weary with looking over the car, I give him opportunity to examine this book at his leisure. A scrapbook differs from a catalog. In its news items it gives the opinions of others about the car I sell, and the clippings do not have that 'I-was-placed-here-to-make-you-buy' air that the catalog figures possess. It is more informal than the catalog and has an air of comradeship."

Trend of Body Design As Indicated At New York Salon

Makers Lean to the More Expensive Type of Coach Work—Many of the Closed Jobs of the Falling and Semi-Falling Top Variety—Cabriolet and Berlines More in Evidence Than Sedan

By GEORGE J. MERCER

THE Automobile Salon held in New York City, Hotel Commodore, starting November 28, which originated as an Importer's Salon, is becoming more and more an exhibition of cars of domestic manufacture. This year twenty of the thirty makes of chassis on exhibition are American-made. These include the Biddle, Brewster, Cadillac, Cunningham, Daniels, Dorris, Duesenberg, Falcon, Ferguson, Lafayette, Lincoln, Locomobile, McFarlan, Packard, Pierce-Arrow, Rauch & Lang, Richelieu, Rolls-Royce, Stevens-Duryea and Winton.

Of the foreign contingent Italy presents the greatest number of chassis makes, including the Fiat, Isotta-Fraschini, Lancia and Spa. Great Britain is represented by the Lanchester and Sunbeam; Germany by the Benz and Mercedes, while France and Belgium have but a single car each, the Hispano-Suiza from the former country and the Minerva from the latter. The absence of all the leading French makers—Panhard, Renault, De Dion, etc.—is noteworthy.

The salon, as a whole, however, presents a satisfactory picture of the new in body design. There is a total exhibit of approximately 60 bodies. These are divided into 12 cabriolets, six broughams, 13 berlines, three limousines, three sedans, 12 touring car bodies, one roadster, one brougham-landaulet and seven inside drive cabriolets.

The list serves to show that the line of bodies presented for inspection is, generally, the most expensive made, and this would indicate that the exhibitors have an optimistic feeling as regards the general trend of business. About one-sixth of the exhibits are open bodies, and it was noted that the closed bodies include more of the falling and semi-falling top bodies than ever before. These are even more expensive than the stationary top kind.

Inside Drive Cabriolets and Berlines Superseding Sedans

There is a total of seven inside drive cabriolets, which is a record. In previous years there have been but one or two examples of this type, and these have invariably been on the British-made Rolls-Royce. These bodies, in fact, seem almost to have superseded the sedan, for there are but three of the latter bodies exhibited. One of these three is a short close coupled body that is being considered by manufacturers as a production car in the near future. It is designed to be a



Seventeenth annual automobile salon held in the Hotel Commodore, New York City, starting Nov. 28, 1921

combination of coupe and sedan.

The exhibition includes yet another new feature in body design, or rather a reversion to an old feature. This is the large number of berlines. This type of body in appearance resembles a sedan. It has a division, however, back of the driver's seat, and the upper part of this division is formed by a window that raises and lowers. Thus the body can be made into one or two compartments at will.

Some years ago this type of body was the only style acceptable by many car users, but it drifted into abeyance. Whether its revival this year will mean much to the quantity built car manufacturer in the coming season is doubtful. The general run of quantity built cars have a short wheelbase chassis and this makes it next to impossible to have a division back of the driving seat and still allow sufficient room for the rear door entrance. There has always been a certain proportion of buyers for enclosed bodies who insist upon more privacy than the single compartment body permits, but if there is not sufficient wheelbase it cannot be considered. However, it is remarkable that a large number of manufacturers are practically making this type supersede the sedan.

As was stated, the inside drive cabriolet has come forward as another substitute for the sedan. The sedan has enjoyed a long run of popularity, but at this show it only equaled in number the limousine that passed out as a favorite several years ago.

Some Makers Use Fabric to Cover Part of Body Sides

This change from the sedan to the inside drive cabriolet for short wheelbase cars indicates that there is a tendency to strive for cheaper production. Manufacturers are apparently attempting to make enclosed bodies as near the cost of the open body as possible.

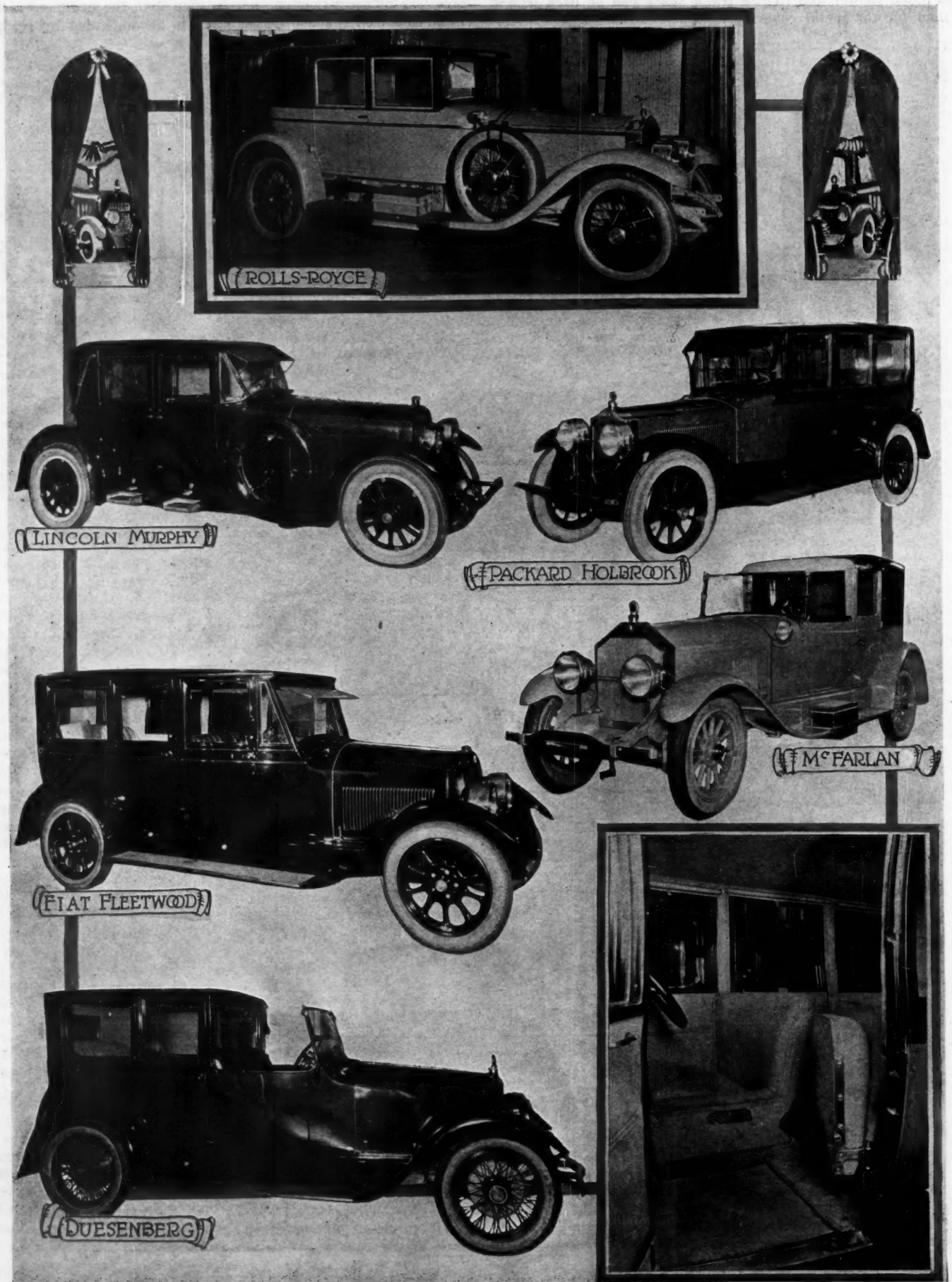
A number of manufacturers have used fabric to cover part of the body sides in place of sheet metal, intending probably to use this measure as one to reduce costs. On the type of cars exhibited, however, this fabric is not cheaper even though the cheapest fabric it is possible to buy should be used. It must be remembered that the fabric must be applied after the metal parts are painted and it requires expert workmen to properly put on the necessary moulding and apply the fabric. This work is less of an automatic operation than

the task of putting on the metal. It is done at the time the painted surface is practically finished and the chances of marring such work are considerable. It is to be expected, however, that in time means will be found to cheapen this work and there will probably be seen more bodies with the sides covered with fabric. Such a development has advantages, for it is much lighter and lighter frame work can be used behind it than for the metal covering.

As to body equipment and accessories, it was noted that on all the close coupled bodies, as well as on those of the larger variety, the use of trunk racks is quite extensive. Many of these racks are of the folding type, and on some models the top of the tank is utilized as a base upon which to rest the trunk. The tank is protected by wood strips, and these give less of a conspicuous appearance than the ordinary rack. In most cases the use of the rack is accompanied by equip-



Cars DeLuxe With Custom-Built Bodies at New York Salon



ment of the back of the body with perpendicular rods to protect the finish.

There appears to be no general tendency to replace running boards with steps, although this has been done in a few instances on open cars. The steps used, as a rule, are made to fasten to the body with a shank, similar to the method used on carriages, rather than having a square casting run up to the shield.

The exhibit served to demonstrate the increasing hold the soft roof has gained upon the body builder. Of the total number of bodies exhibited there is but one equipped with a solid roof and this was of the coach type formerly used on carriage work. All the others are made of fabric. Some few had metal formed over the edges and the appearance from the side gives the impression that there is an all metal top. Many of the bodies are skeleton lined on the interior. The bows and slats on such jobs form a visible lattice work. The space between the squares is about six inches.

This design affords a light appearing upper structure and shows the tendency of body builders to make bodies as light as service will permit. The roof, at best, is but an umbrella and it is in line with good sense to make it light. It is also an added attraction to make it light in appearance. Brewster has one body in which the fabric was also used in the side and back quarter. The method of applying the fabric, however could be improved upon. The screw heads appearing in the moulding give a rough appearance, as though the car was one only suitable for hunting purposes or for cross-country use.

Mudguards of the Full Crown Type and Large

There is a general use of ventilators on the roofs, as well as ventilators on top of the shroud. On many of the open bodies the lower half of the windshield is stationary. This has been true in the past on high class enclosed bodies, but the open bodies had not before been so equipped.

Mudguards on the models exhibited are principally the full crown shape and rather large. Even the few cycle guards shown are made with a reverse turn at the rear end. A few of the cars from abroad use a shape nearly horizontal both for the front and the rear. One exhibitor has guards covered with imitation Spanish leather.

The fabric sun visor is fairly well represented and the Brewster and Healey types of windshield are shown on various cars. The large circular headlight is very general, although several examples of cowl lights are shown. In many cases the spare tire is carried at the front.

Apparently there has been a reversion to some of the features that were used in earlier days. In practically every case, however, the use of the older form of body building is well applied and there is not the appearance of drifting backward. Rather there seems to be a well directed effort to combine the old with the new for the benefit of change and the old gives a touch of newness all its own. This trend was particularly noticeable in the tops of open bodies.

The body lines of the open type include, for the most part, the flat top edge. An effect that is quite new has been produced with a Holbrook body on a Packard chassis. A recessed panel about three inches wide extends the entire length of the body and hood. This panel is sunk down about one-quarter inch and is painted red, while the body is brown.

New radiator designs are predominated by the round form. The rear corners of open bodies are also rounded.

Open body trimmings do not differ from previous years, except, perhaps, there is more plainness in design. Design leather is also common and interior lights are used on one open body, these being the small round pattern fastened to the rear bow on each side. Step lights are also used in some cases. They are generally placed within the splashers. Foot rests and robe racks are the rule and the trimmings on the newest designs are made to conform to the body line all the way around, including the back seat. In other words, the top line of the body is distinct and visible throughout, giving a clean-cut look to the interior, although it is doubtful if the rear seat is as comfortable as it would be were the trimmings higher. The outside handle is dispensed with on half the open bodies, while the others use both the outside and inside.

Appliances Crowded Into Too Small a Space

A variety of designs is shown in the trimmings of the enclosed bodies. The wood panel with decorative designs is used largely on the doors and the inlaid natural wood strip is also used across the division on the doors. The designs of the seats and backs give an appearance of comfort, either when plain or pleated. The use of divided seats is quite common, the division being made in some cases to swing back out of place in the front seat. The rear seats, however, have a substantial arm chair division. The use of the arm rest on each quarter panel is general.

The interior appearance of practically all the enclosed cars gives the effect of study in design. There is, however, on some of the models, a tendency to crowd all the various appliances into too small a space. For instance, the visible vanity case, the dictograph inside the door, pull-to handles, regulator handles, etc., all within a small space, give the appearance of too much silver bunched together.

Corner and center dome lights are the rule, as are visible vanity cases. The interior wood finish, in most cases, is confined to the moulding around the windows. The seats are, in many cases, furnished with pillows and pillows are used as foot rests. The doors, generally, are plain. On some of the berlines pockets are provided on the doors in the driver's section and occasionally a panel effect on the rear door is seen. More often, however, the rear door is entirely without design and never with a pocket on domestic cars.

The upholstering material is principally worsted and wool fabrics, broadcloth and bedford cords. The color gray predominates. There was but one body covered with mohair. On the berlines the driving compartment is finished in leather, and on some models a shoulder division is used.

As to colors, there is, as usual, a wide range. Brown and red are used together with good effect. There are several grays and a few blues. There are two unfortunate combinations, one being due to an overdose of red trimming and the other having a similar fault due to nickel and bright aluminum. Striping is used to some extent on half the cars, the broad glazed stripe with two hair lines being the most common. In a few cases, the hoods are striped.

Body builders having exhibits at the salon are Brewster, Brook, Ostrok, Pease, DeCausse, Derham, Fleetwood, Healey, Holbrook, Locke, New Haven, Rochambeau, Smith-Springfield, Waltern and Murphy.

Filling Station Invites Tourists to Stop and Cook

MOST folk operating filling and service stations rather hurry their patrons through, their desire being, apparently, to get one man out of the way so another customer can come in, even though the customer be not in sight.

But A. C. Willard, who operates a filling station in Spartansburg, S. C., has a different idea. He wants his patrons to tarry a wee—not only tarry but spend the night if they so desire, and at this

season of the year when literally hundreds of motor tourists are passing through the state enroute to Florida, his plan meets with much commendation.

Willard operates his station near a large vacant lot. On this lot he says he is going to furnish shelter in the way of a shed, gas for cooking meals, electric lights, dressing rooms and lavatories for men and women. Of course these "accessories" may be somewhat primitive and

impromptu, but many a wayfarer hitting out for the sunshine of Florida will welcome the accommodation of that shed, and the opportunity to get away from the car and cook with the gas, and yet not leave the car for any length of time, will also be pleasing.

The plan of Willard is being watched closely and it is believed that it will result in causing many tourists to tarry over night in the city of Spartansburg.

Mechanical Details of High Priced Cars at Automobile Salon

Richelieu Has First Showing at This Exhibition—No Radical Departures in Design Among the American and Foreign Cars Presented

By PETER M. HELDT

FROM a technical standpoint we never look for very much at the salon that is entirely new. Coming as it does, directly after the great foreign shows, whatever there is of recent development among the foreign chassis has been exhibited at one or the other of these shows and has been covered by reports on them by our foreign correspondents.

Leading American car makers, even though they may exhibit at the Salon, would hardly select that exhibition of comparatively narrow appeal to present any radically new designs. Novelties would be expected only from those manufacturers who cater chiefly to that select clientele for whose benefit the Salon is held.

Richelieu Makes First Appearance

The one car to make its first appearance at the Salon was the Richelieu, a new assembled product from Asbury Park, N. J. It is typical of a class of car of which there are already several on the American market, having a powerful four-cylinder engine, a sporty type of body and high-class equipment.

The engine is a Rochester Duesenberg four-cylinder 4¼ by 6 in., 85 hp. Other parts and equipment include a new Brown-Lipe clutch and transmission, Standard Parts front and rear axles, a Gemmer steering gear, Bosch magneto, Westinghouse electric equipment, Hartford shock absorbers, Romon lubricator, Fleetwood body and Houk wheels.

The car has a 130 in. wheelbase and is made for the present in three and four-passenger open styles. The three-seated model seats two passengers on the main seat, and, in addition, has an outside chauffeur's seat. The equipment includes six wire wheels with cord tires, a trunk rack, tire covers and a 130 amp. hour battery.

Rear Axles With Torque Tubes

Looking over the foreign chassis at the Salon, one is impressed with the fact—pointed out at once by our foreign correspondents—that European design tends strongly in the direction of rear axles

with torque tubes, with either a forked or spherical connection apparently to the transmission case at the forward end. The spherical connection apparently is much more prevalent than the other.

Unit Power Plant Favored

At the same time Continental manufacturers have gone in quite strongly for unit power plant construction with three point support. Many of them are using four-speed gearsets which overhang the engine supports on the flywheel bell housing a considerable distance (which supports are generally more or less hidden by the dashboard) and, as the torque tube extends directly from the rear end of the overhanging transmission without any support from the frame at that point, this gives a chassis of unusual, though very clean-cut appearance.

There are two eight-cylinder-in-line engines at the Salon: the Duesenberg, which was fully described in a recent issue of *Automotive Industries*, and the Isotta Fraschini. Both of these are chassis of exceedingly trim lines.

Isotta Has 142 Inch Wheelbase

The Isotta has a wheelbase of 142 in., which is probably the longest wheelbase passenger car that has ever been built. This car has a lock on the transmission. There are three finger levers on the steering wheel: for the spark advance, the throttle and the mixture adjustment, respectively. All three are of the same design and are spaced evenly in a circle, but their uses are plainly marked on them.

Many features are notable on this chassis that are adopted in the interest of clean chassis lines, for which Italian cars are so noted. Thus the timing shaft for the ignition distributor passes through the crankcase from one side of the engine to the other. The high tension ignition cables from the distributor do not extend directly to the spark plugs, but pass through an enclosed space at the side of the engine, so that the visible portions are comparatively short. The front springs are held to the axle by pressure plates which have four threaded studs forged integral with them.

The rear underslung semi-elliptic

springs are held to loose collars on the axle housing by U-bolts or saddle bolts, for which saddles are forged on the collar, one in front and one in the rear of the axle housing. This is contrary to the usual practice where saddle-bolts are used, which are made to straddle the axle housing itself.

New Benz Six Exhibited

A new six-cylinder model of Benz car is shown. In this, as in the Isotta eight-in-line, there are two carbureters. The cylinders of the Benz six are cast in two blocks and each block has its carbureter bolted directly to it, on the side opposite from the inlet valves, the inlet passage extending through the cylinder block.

There is a tire pump on the cam gear housing. The Robert Bosch electric system is fitted to this car. In this the starter motor is engaged with the flywheel gear ring by means of a sliding armature under the influence of the magnetic pull of the field frame, relative to which the armature is axially displaced by a spring. This is the system originally developed by Rushmore, whose plant and business was bought by Bosch about eight years ago.

In order to avoid possible injury to the flywheel gear ring from the clashing action of the gears, the starter pinion is made of hard bronze and of comparatively small dimensions, so that its teeth are weaker than those of the driven gear and would break first in case of abnormal stress. This pinion is a cheap part and can be quickly replaced.

Benz Fan Has Novel Shape

On the Benz the transmission, which is a four-speed unit, is mounted amidships, between two cross members of the frame. The cross shaft of the brake linkage with the equalizing mechanism is enclosed in the gear box, which tends to make the chassis layout cleaner. There is also a neat feature on the circulation pump.

The inlet and outlet to the pump are in the form of a single casting of T shape, mainly above the pump proper. To the horizontal sections of the T the hose connections to the radiator and

jacket are secured, bringing these two connections in line and making it appear as though the water passed from the radiator directly to the engine jacket.

The Vee fronted radiator has led to the adoption of a rather peculiar-shaped fan. This fan is quite small, the large size of the radiator making much assistance from the fan unnecessary. It would seem that in the design of this Benz an attempt had been made to meet somewhat contrary requirements; namely,

large size of car and economy in fuel consumption and upkeep, for the engine is very small in comparison with the space provided in which to lodge it.

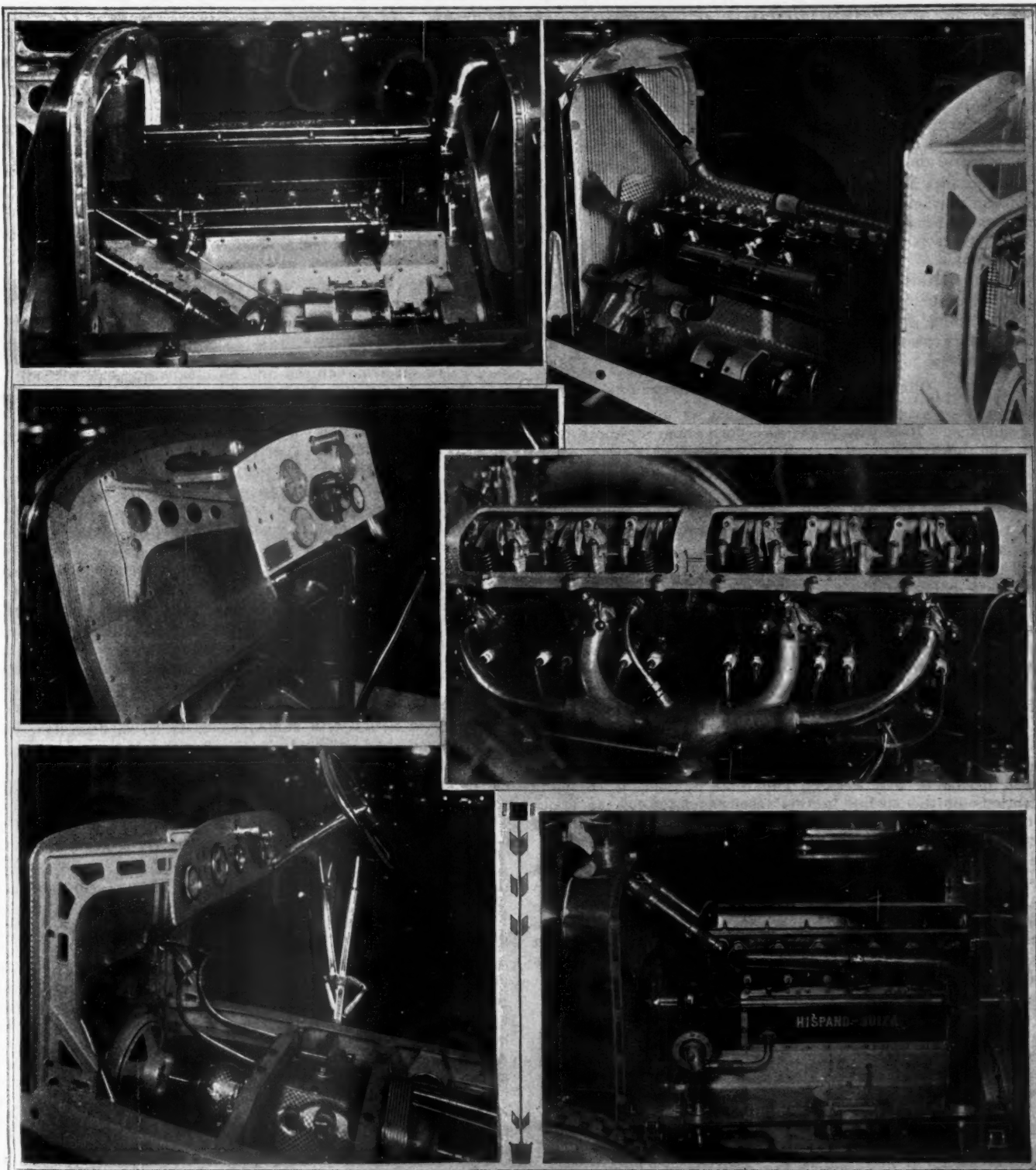
Wood Wheels the Majority

Since the cars at the salon are representative of the high-grade product of the automobile industry, it is interesting to note the type of wheels on the models exhibited. Wood wheels are in the lead, but wire wheels follow closely, while the

disk and pressed steel spoked type are used on a few models only.

A rather remarkable feature is the strong representation of wire wheels, these being fitted on the following makes of cars: Benz, Isotta, Minerva, Hispano, Rolls-Royce, Cunningham, Winton, Lanchester, Daniels, Baker electric, Duesenberg, Rochambeau and Richelieu.

Some exhibitors, like Winton and Daniels, show models with two or three different types of wheel.



Upper left, Isotta-Fraschini, showing the two carburetors and accessible layout of control rods. Center left, instrument board mounting on Isotta-Fraschini. Lower left, layout of amidships transmission on Benz. Upper right, Benz engine compartment. Center right, Lanchester engine; note the two plugs per cylinder. Lower right, Hispano-Suiza; note accessibility of pump and distributor.

Facts in the Trend of Proper Chassis Lubrication

One of the Recent Attempts to Overcome This Is by the Elimination of Rubbing Surfaces—Relative Merits of Oil and Grease as Lubricant for Chassis Members

By C. T. MYERS*

THE main reason why chassis lubrication is neglected by owners and operators is because it is an inconvenient job and a filthy, dirty one. The secondary reason is that these chassis bearings will go on with their functions for a considerable length of time in spite of lubrication, and they make comparatively small outcry against abuse until they are beyond repair.

Sooner or later, however, they fail and often cause the early failure of other parts. Especially is this true of such parts as spring bolts, steering pivots, clutch bearings and universal joints, where bearing pressures or rubbing speeds are relatively high.

Elimination of Rubbing Surfaces

One way to avoid lubrication difficulty is to eliminate rubbing surfaces. Recently there have been some attempts to do this, and effort naturally enough centered at points where bearing pressures per square inch were high and much trouble has been experienced, viz.: spring shackle bolts, where pressures up to 1000 lbs. per sq. in. are sometimes encountered.

One example is that of a fabric shackle being developed for semi-elliptic springs by the Belflex Corp., New York. It is made by clamping together four or more strips of rubberized fabric into a link which is bolted fast to the spring at one end and to the frame bracket at the other end. The thin corrugated separators which come in contact with each face of each strip of fabric, supply the required clamping surface and carry the load on the bolts.

The following statements are made by the developers. "Installations on a number of different makes of cars have run for over a year and a half, and will, from all appearances, last for many more years. In a shackle-testing machine a spring with two fabric shackles was vertically flexed continuously over a period of five weeks. The total number of complete deflections of the spring in this test was 3,600,000, or about 70 per minute. When the shackles were taken out, wear and stretch were almost imperceptible."

"The top leaf of the spring is prepared by punching holes for the shackle bolts in it near its end and then turning up this end to the proper angle for setting the shackle link. The spring is allowed free movement by the shackle up to the point that the snubbing action starts." The makers claim that this shackle is able to withstand side thrust, and that it has absolute rigidity and freedom from sidesway on the road.

They also make the following claims:

1. It requires no lubrication.
2. It will outlast the present type of shackle.
3. It acts to snub the spring when so desired.
4. It cannot squeak or rattle.
5. It requires no attention and no adjustments for wear.
6. It saves spring breakage due to rebounds and increases the life of the spring by delaying fatigue in the spring metal.
7. It cushions the car from minor road shocks, there being no metallic contact between frame and axles.
8. It is installed easier.
9. It is always clean and not covered with oil and grease.

Another development which eliminates spring shackle bolts is the patent rubber block construction on the two-ton Mack bus chassis of the International Motor Co. Here the ends of the spring enter the middle of blocks of rubber, which are being held under compression in the frame brackets, and which not only hold the springs to the frames, but act as cushions against shock and vibration.

The following claims for this type of construction are made by the designers:

1. No lubrication.
2. Upkeep much less, since no grease cups and no grease or oil are required and no cleansing is necessary.
3. Ability to insulate the frame from many shocks ordinarily transmitted from the springs, thus improving the riding qualities of the vehicle.
4. No friction between the surfaces, consequently no wear, looseness or rattle.
5. The rubber tends to compensate for twisting action between spring and frame.
6. Side and end thrust taken without metal-to-metal contact.
7. Less horizontal motion of axle, because springs elongate from middle toward both ends. This lessens the steering effort and prevents unnecessary brake action.
8. Tends to reduce so-called "crystallization" of the frame, steering gear parts and other members, due to vibration transmitted by shackles of the older type. The tendency of nuts and rivets to loosen is decreased.
9. Increase in the life of the tires.
10. Does away with shackles, spring eyes, bushings, hardened and ground steel shackle pins, grease cups, shackle bolts and nuts.
11. Two or more main leaves of the spring can be made to bear in the rubber, thus giving added strength.
12. Spring construction is simplified, since no wrapped eye is required. Cost of assembly and replacement is also less than with spring shackles.

"Test runs of 20,000 miles indicate that the rubber blocks will stand up for 25,000 miles without removal. The eight blocks can be removed by two men in an hour and renewed at a nominal cost."

Fabric and rubber shackles are still in the development stage and it may be some time before their good and bad points can be evaluated by experience. Both have been tried with indifferent success, but the applications cited above embody detail modifications which may overcome past failures. A number of years may elapse before experience enough is gained with these devices to have warranted their use on more than a small percentage of our motor vehicles. Meanwhile, we shall have with us hundreds of millions of rubbing surfaces that must have lubrication.

Self-lubricated bushings are being used extensively for bearings where pressures are light and rubbing action comparatively infrequent. They serve well where they are protected from dust and moisture, as in the clutch pilot bearing and

*Abstract of paper read before the Metropolitan section of the S. A. E.

sliding sleeve, steering gear post tube, etc. They are also used for—

- a. Brake and clutch pedal or shaft.
- b. Clutch throw-out lever or control fork.
- c. Brake equalizer.
- d. Rear axle and chassis brake cross shaft.
- e. Rear axle brake spider and camshaft.
- f. Starting crank bracket.
- g. Torque rod hanger or bracket.
- h. Spark and throttle controls.

One of the latest developments in self-lubricated bushings is that of the Cleveland Graphite Bronze Co. This bushing can be made with a very thin wall, as it is formed up in quantities from a strip of rolled bronze which is as wide as the bushing is to be long. Indentations are rolled into one surface of the strip and these are filled with graphite. The strip is cut to proper lengths and each length rolled into bushing form, after which the graphite is baked. Plain bushings are made in the same way, which insures very homogeneous, dense metal of a minimum thickness and a hard-wearing surface.

Cast bronze bushings with graphite inserts, and oil impregnated wood bushings have been made for some time back by the Bound Brook Oilless Bearing Co., Bound Brook, N. J., and the Arguto Mfg. Co. of Philadelphia, and have been quite extensively used.

Self-lubricated bushings do not stand up for any satisfactory length of time under heavy or steady loads, especially where they are exposed to dirt and moisture. For spring eyes, spring shackles, axle steering pivots and steering cross rods, they will only stand up when given an additional source of lubrication. The reason is not hard to discover, for we know that such service needs a far greater amount of lubricant than can possibly be held in the bushing. When this gives out, some wear immediately takes place and the particles rubbed off become imbedded in the soft material in the bushing.

The bushing then becomes a lap and begins to eat into the pin or shaft in a manner the very opposite of that intended. When any wear has taken place atmospheric moisture can enter and oxidize the pin, the oxide later being

rubbed off and held by the bushing. This can often happen before any other wear takes place. Further, the indentations for holding graphite decrease the load carrying area by 10 per cent to 30 per cent. The Cleveland Graphite Bronze Co., having had experience with many hundreds of thousands of self-lubricated bushings in all kinds of service for the past four years, no longer recommends them except for oscillating light load bearings or intermittently rotating bearings of light load.

It has been demonstrated repeatedly that seldom are the grease or oil cups of the average passenger car given thorough attention more than once a week, and the great majority of cars are lucky to receive such attention more than once a month. Motor trucks, when cared for under a good garage inspection system, will get somewhat better attention than the passenger car; but the chassis bearings of thousands upon thousands of trucks get but slightly more attention, comparatively, than does the average passenger car.

Important Units Receive Attention

In gearboxes we have an instance of careful thought for lubrication in an inaccessible position. The details have been carefully worked out so that, under ordinary conditions, two fillings with moderately heavy oil per year will suffice for satisfactory service. The same practice applies to rear axles, so far as the lubrication of parts in the housing is concerned.

The lubricating method in these two instances is that of retention of lubricant and exclusion of dirt, to which method

the design and operation of these parts lend themselves. This also applies to wheel hubs, and might be extended to universal joints, steering gear housings and some types of fan mountings.

The lubrication of engines has been given careful and constant attention until very reliable systems have been developed. These systems are all based upon a continuous supply and wastage of lubricant, and the exclusion or removal of foreign matter. It is upon this principle that the lubrication of most chassis parts should be handled, involving a more or less continuous flow of lubricant.

The more continuous this flow when the vehicle is being operated, the more efficiently will the bearing surfaces be lubricated, other things being equal. This being the case, care must be exercised to see that dirt, moisture or other non-lubricating matter is not picked up and led to the bearing surface.

Three types of bearings must be considered—ball, roller and plain or bushed bearings. Ball and roller bearings must operate behind tight closures, or, at least, closures that allow but a trace of moisture or dirt to enter. Bath lubrication is very satisfactory under these conditions, which are found in gear-boxes, rear axles and wheels.

Where the ends of bearings are in any way exposed to the elements, bath lubrication, of course, is not available, both on account of contamination and excessive wastage. A plain or bushed bearing must then be used; and to constantly maintain an oil film, preventing surface abrasion and oxidation by moisture, a clean automatic feed must be supplied.

Choice of Lubricant for Chassis Parts

The most important consideration in the design of the chassis lubrication devices is the choice of lubricant. Shall grease or oil be used? Each has advantages and drawbacks.

Grease is stiff enough, as a rule, to be more cleanly than oil and not flow over painted surfaces near the grease cups. It lends itself to compact and simple design of cups integral with spring bolts, and its firmness allows grease cups and fittings to be set at an angle or even in an inverted position, which is often very convenient where holes for the cups must be tapped in restricted locations. Some claim that grease will support heavier bearing loads, but the difference is more apparent than real. Grease can be forced

by hand screws from the cups to the various surfaces. In hot weather the heavier greases are possibly more cleanly to handle than oil with the ordinary chassis fittings.

On the other hand, grease must stand under heavy indictments:

It is a notorious dirt carrier, and the methods of handling it expose it to dirt at every turn. We are all familiar with the open grease pail in garages, and with the dirty grease paddle which is scraped over the edge of the pail. We all know of dirty fingers lending their share to the contents of the refilled grease cup or grease gun, which often catches no small portion of the dirt accumulated on the edges of the cup or fitting.

Grease cannot easily be cleaned when dirty, whereas oil can be filtered and much partly used engine oil can be used for the parts of the chassis.

Another important consideration is that most greases contain considerable amounts of soap and inert matter which make them more or less stiff and heavy, but which have a negative qualification as a lubricant. The heavy body of most greases is commonly thought to give them greater capacity for maintaining a lubricating film between the wearing surfaces; but this does not hold, for in almost every case the stiffer the grease the poorer its lubricating value and its load sustaining qualities, the inert filler acting as much in the nature of an abrasive as a lubricant.

Grease does not readily spread itself in a film over the wearing surfaces, especially if it is applied when they are loaded or when cold. This offsets the apparent advantage of being

Qualifications of Oil as Chassis Lubricant

able to force grease through cups or fittings, for it often juts out at the opposite end of a bearing without actually spreading over that bearing, the appearance of grease being a misleading sign that the bearing is properly lubricated. If all parts of a bearing are not lubricated the dry spots will soon accumulate dirt or inert matter and start a cutting action.

When very cold, it is almost impossible to force grease through small drilled holes and channels. It is, therefore, difficult to know when a grease-filled bearing is getting even the lubrication designed for it.

With the past three years a notable attempt has been made to increase the effectiveness of grease lubrication by means of pressure application. The Alemite system is used by a large number of concerns building passenger cars and trucks. It is a much handier and more effective way of applying grease than by means of grease cups.

It has the additional merit of being comparatively inexpensive to install, even on cars in service. It has most of the failings of the older methods, however; for handling a grease container around the average chassis is always a dirty job. One must still "get out and get under" to lubricate all parts of the chassis and it must be done often. The fittings and hose sooner or later accumulate dirt, which is forced into the bearings. When the fittings are not closed with caps, dirt and water from the washing hose will enter them.

The number of times per month that individual attention is necessary is still excessive, and for the best results a special grease recommended by the manufacturers must be used. The job of greasing will be slighted, too, if the grease gun or hose connection has been misplaced or jammed. On such parts as wheel hubs, universal joints and radiator fans, which with difficulty retain oil and have a reservoir for a considerable amount of grease, this system is very satisfactory.

Oil the Best Lubricant

Oil as a lubricant has advantages over grease, but its proper application to chassis bearings has required more painstaking design than has usually been given to it. This has previously mitigated against its use, especially on passenger cars, but the advantages that follow are appealing more and more to designers and to users.

1. Oil will maintain as heavy a gearing load as grease, and with less friction.
2. Oil fed to one properly located point in a bearing will quickly spread over the entire bearing surface.
3. Oil will flow through a very small hole, and it can be conducted a considerable distance by means of capillary attraction and surface tension.
4. Oil will carry much less dirt than grease; it can be filtered, and it is not nearly so much exposed to dirt when in bulk or when being applied.
5. Oil contains no inert matter to clog holes and channels.
6. The oil used in the engine can be used in the chassis oilers, eliminating the necessity for carrying two kinds of lubricant.
7. Oil is much more easy to apply automatically than grease.
8. A flow of clean oil tends to clear a bearing of any dirt which it may contain, and a bearing arranged for oil lubrication can be flushed and cleaned with gasoline or kerosene.
9. When oil is used on spring bolts the seepage works down into the spring leaves and keeps them from rusting, then stiffening and sometimes breaking.

If oil is used as a chassis lubricant, the method of application should be carefully considered. It goes almost without saying that the old type of oil cups, holding only a thimbleful of oil, is the merest excuse for a satisfactory oil fitting.

Oil cups need daily attention, as the oil feeds out of them quite rapidly and many of them are not easily reached. Atmospheric moisture, rain water and water from the washing hose enter then, and, passing to the bearing surfaces, start the corrosion that is the worst enemy of a polish steel surface.

They stick out and are exposed to damage, and, when damaged, they are seldom replaced promptly. If cups of greater capacity are used, they are still more liable to damage, and the flow must be controlled or they will soon empty, wasting oil and then starving the bearing.

From a dollars and cents standpoint, as we have seen, it is quite essential that chassis parts be lubricated in a manner that is more or less automatic and calls for a very small amount of attention on the part of the operator and the garagemen.

In this connection some remarks of Mr. Henry M. Crane before the S. A. E. in his paper on "The Passenger Car of the Future" are of interest—"I think that we shall see the increased use of oil for lubricating other chassis parts than the engine, and that this use will be simplified, as it has been in many other commercial lines, by a design allowing for carrying a supply of oil at various necessary points, only occasional replenishment being required."

Mr. William B. Stout's paper read before the S. A. E. on "What Motor Cars Could Be" contains the following: "Moreover, this car of the future should be designed **primarily with the owner in mind rather than the factory.** This means a car that can be taken care of by the owner with small outlay of effort or skill and infrequent oiling; a car with no grease cups or unlubricated joints."

Since 1911 the writer has been studying and endeavoring to improve chassis lubrication of motor vehicles, and, having tried almost every kind of device and method known today, has come to the conclusion that the best results will be attained when the following requirements are met:

1. Oil should be used (preferably engine or axle oil) unless pressures or rubbing speeds are very light and intermittent.
2. Devices should be built into the chassis or its parts, so that they are not excrescences liable to be damaged.
3. Devices should need attention but once in two or three months.
4. Devices should not require special filling attachments, which get dirty, damaged or misplaced.
5. Devices should feed automatically when lubrication is needed.
6. Devices should feed clean oil, eliminating dirt and moisture.
7. Devices should be simple, sturdy, and have no moving parts to wear, get out of adjustment or be misplaced.
8. The feed should be constant when in action so as to flush the bearing at points remote from the feed opening.
9. In general, each part to be lubricated should be independent of the others so that failure of lubrication at one bearing does not affect other bearings.
10. The devices or system should not interfere with the accessibility of other chassis parts which may need adjustment or repair.
11. Minimum number of filling points, all to be quite accessible.
12. Devices should not waste oil and should be as clean as possible.

The Romon system, made by Roberts & Monroe, is the most elaborate attempt at thorough chassis lubrication that is on the market today. It consists of a multiple plunger oil pump in a chamber which holds two or three quarts of oil and contains 10 to 16 plungers. These are actuated by cams which are operated by a hand ratchet lever. A pipe from each plunger feeds the various chassis bearings, each bearing being supplied with a fitting containing a ball check valve.

Once per day, or oftener if thought necessary, the driver of the vehicle operates the ratchet lever a number of times, forcing clean oil to every bearing that has a pipe connection. The pump chamber can be located under the hood or floorboards, the lever extending so as to be easy of access for operation.

This system not only feeds clean oil, under high pressure if

necessary, but can be used to feed kerosene, say once a season, to cut the accumulated dirt and clean the bearings, if necessary. The bearings can be fed when the vehicle is in motion as well as when in the garage, and the system is certainly a whole-hearted attempt to give the poor neglected chassis bearing its due.

During the past year it has been furnished as standard equipment on Saxon cars, and almost any owner's car can be fitted out with the system. Whether the flexible connections to front and rear axle will stand up under continued vibration is yet to be demonstrated, while the complex piping makes a repair job awkward and reduces accessibility. The system has great merit from the caretaking owner's standpoint, as it is handy and clean to operate.

Universal Joints

Wick oiling of spring bolts has recognized advantages. The Franklin car for a number of years has been equipped with hollow spring bolts into which dipped wicks lead to the bearing surface of the bolts.

Some trucks are similarly equipped, but the supply of oil that can be carried in the pin is necessarily quite limited. The clutch and brake controls of the Franklin car are also equipped with wick oiling devices; and the Lippard-Stewart light truck provided lubrication for clutch and brake controls by wicks in hollow shafts and by magazine oiling brackets.

Drag links for the steering mechanism made by the Cincinnati Ball Crank Co., are arranged so that they can be filled with oil and fed by wicks through the ball sockets to the ball connections at either end of the drag link.

Manufacturers of universal joints have long desired oil lubrication, but the rapidly revolving parts would not hold oil long enough. Fabric joints would eliminate the necessity for lubri-

cation, but they are not yet being generally adopted for propeller shafts in spite of long try-outs.

Clutch sleeves, release bearings and pilot bearings have always been difficult to lubricate. Pilot bearings have for the most part been ball bearings which received little or no lubrication, and they have given very good service when dirt or moisture did not reach them.

One concern formerly drilled its engine crankshaft to allow crankcase oil to reach the pilot bearing by splash, but evidently more moisture (from products of combustion reaching crankcase, or through the breather tube) than oil reached the bearings, for they rusted and gave trouble. Self-lubricated bushings may prove a satisfactory substitute for the ball or roller bearing at this point.

Spring Lubrication

There has been some argument against the advisability of lubricating spring leaves, because it lessens the damping effect of interleaf friction, but spring makers put graphite between the leaves to cut down friction, and there is no doubt but that cars ride better when new than when the springs are old and rusty. Most instruction books state that springs should be taken apart once a year and regreased, and there are numerous devices on the market, evidently in response to a demand for such things, for applying oil to springs.

The application of proper amounts of oil to spring bolts will result in a very satisfactory spring lubricant, as the surplus oil seeps slowly down to the spring leaves. It will keep springs as flexible as when they come from the spring maker and afford the car the protection for which the springs were designed instead of getting dirty, rusty and stiffening very perceptibly. This is of far greater importance than is generally suspected.

Chart Showing Pressures, Bearings and Kind of Lubricant Recommended

SUMMARIZING the points to be lubricated, we find that they can be divided into three classes, covering light, medium and heavy pressure bearings, and under each class they can be subdivided into bearings subject to intermittent

and to continuous motion. They might further be subdivided into bearings subject to high speeds and to low speeds, as speed is often a very important factor.

CLASS.	KIND OF MOTION.	BEARING.	LUBRICATION.
Light Pressure	Continuous	Motor support (third point)	Oil, automatic
		Fan	Oil, automatic
		Water pump shaft	Grease or metallic packing
	Intermittent (high speed)	Clutch sleeve	Oil, automatic
		Clutch spigot	Oil, automatic or self-lubricating bushing
		Starting motor (outboard)	Oil, automatic or self-lubricating bushing
Medium Pressure	Intermittent (low speed)	Spark and throttle controls	Self-lubricating bushing
	Continuous	Gear box	Oil, bath or circulating pump
		Rear spring seat sleeve	Oil, automatic from axle
	Intermittent	Clutch thrust	Oil, automatic
		Clutch and brake pedal shafts	Oil, automatic or self-lubricating bushing
		Brake rocker shaft	Oil, automatic or self-lubricating bushing
Heavy Pressure	Continuous	Spring bolts	Oil, automatic
		Springs	Oil, automatic
		Universal joints	Oil automatic, or soft grease bath
		Wheels	Oil or grease bath, lubricating
		Rear axle	Oil, bath
		Steering gear	Oil, automatic or bath
	Intermittent	Drag link	Oil, automatic
		Steering pivot	Oil, automatic
		Steering cross rod	Oil, automatic
		Radius rod	Oil, automatic
		Torque arm	Oil, automatic
		Tire pump	Oil, automatic

Why Not

Departmentalize and Run a Real Business?

This Page Is Dedicated to the Story of a Man Who Thought That He Knew All About His Own Business but Found That He Did Not Even Have a Meal Ticket

IF you will stick with this story and read it to the end, I believe that you will agree that it is the story of a specialist merchant who enlarged and departmentalized his business and thereby lifted from his mind the worry about the rent bills, which have a habit of dropping onto the manager's desk the first of every month, regardless of whether his specialty is selling or not.

The subject of this story was (and is) a piano merchant. His father had been a piano merchant before him, but under different conditions. The father was a very artistic piccolo player. Because this man was a musician he started a music store. This may or may not have been because the living as a piccolo player was too slender for a large and interesting family. Anyway, with his musical reputation, he was a very successful merchant. His buyers, like himself, leaned more to music than to business, and he did very well. He sold everything from music to all of the instruments that would play it.

Eventually this man died and the son who took over the business soon became the sort of a man who was pointed out in business gatherings as an amazing example of efficiency. He was one of the first to gather the full force of specialization, so he analyzed his business and once a department dropped off of the credit side of the ledger for a short period, he sent it to the discard. So one by one the departments went, and there was nothing left in this store but pianos.

You all know how some persons over-worked this specialization thing. They got so narrow that they wanted all of their customers to dress and talk exactly as they did. Salesmen were taken in hand and told just how much of the handkerchief was to appear from the upper coat pocket, what inflection should be put on the "good morning" and so on.

Well, this man marched at the very front of this procession.

Then there came a long spell of bad weather one January (a month when pianos are hard to sell) combined with a street car strike and several other bad features and this man did not sell anything all month. And even his best installment purchasers failed to come in and see the cashier. The merchant was somewhat temperamental, and despite the fact that he had plenty of money to tide him over indefinitely, he decided that a



big mercantile business that could have so many blank days was wrong somewhere.

About this time there was a Red Cross collection to be taken up and as one of the leaders in his trade, this man was asked to gather in the money from the musical instrument men. One of the first places he went on this mission was to the store of his biggest and best rival.

To his surprise he found the man in his office with a customer and he had to wait in the big salesroom. While sitting there wondering why this merchant could be busy, he heard the cash register ringing and finally decided to investigate.

Right there he had the surprise of his life. The piano merchant was doing a steady business in talking machine records, and while this specialist was standing at the counter observing the motions necessary in a small business, a record customer asked about a piano and was hustled upstairs in no time to get all of the information he wanted (and a lot more than he had expected.)

Eventually the manager's office was cleared and the Red Cross solicitor was admitted. In about two minutes he got the subscription but he stayed for half an hour to ask about this small business. The rival was generous and told him a lot of facts that surprised the specialist. Some of the high points were about as follows:

The talking machine records profits about pay the rent.

The so-called small business almost

equaled the piano business in volume of sales; the record business about paid the rent; since the small business had been put in, there never had been a day without sales; about 20 per cent of the piano prospects came through inquiries at the record counter; the number of people talking for and about this particular house has been doubled, and this merchant enjoyed the "small" business better than he did the piano business.

The specialist went back and looked at his own handsome, but lifeless store. Within two months he had started a talking machine department and today this branch of his business equals the piano business.

Both of these men have been and are successful. They both went into the smaller business in the same way and the proper way.

When they decided to add another line of merchandise to their wares, they made a department of it, hired a talking machine man, and let him work out his own problems under their advice.

They let it be known to all of the employees in this new line that they were expected to watch for piano sales and, when they introduced a prospect to the piano department, they would get credit and, in event of a sale, they would get a commission.

The automobile business entirely too often is a specialty business, or when side lines are added they are not properly connected up with the older department. To the outsider, who has watched the development of other lines of business, it appears rather foolish that so often a car purchaser cannot buy anything for his car from the store where he bought his car.

Recent inquiries have told of car dealers who are making as much as \$300 a month from the turnover of a \$5300 stock in equipment for the cars which they sell. Even a big car dealer cannot afford to miss this opportunity.

In every line of business except the automobile, the endeavor is to keep the customer from ever going any place except to the original store for anything in that line. Automobile merchants are deliberately driving their best customers into contact with their rival merchants.

What department does your place lack? And keep this thought in mind:

The dealer who sells cars only is merely building up business for a lot of other merchants.

What Other Dealers Are Doing

To Keep Busy Through the Winter

An Educational Campaign

THROUGH an extensive advertising campaign, we will endeavor to increase the business of our service department, and incidentally conduct an educational drive concerning the merits of the cars for which we are agents. The benefits of this will be principally derived next summer, which we expect to be the greatest year in the history of the automobile industry.

"First, our service department will be made as nearly complete as it is possible to make it. We plan to make the actual work we do our best method of advertising our business, and therefore, our principle will be 'not a single job unless it is done right.' Personal supervision of important work for our customers will be given, when at all possible. We will make our business advertise itself."

"We will next center our attention on advertising in the newspapers. Within a very short time our state road commission will begin its construction program under the \$50,000,000 bond issue and we cannot neglect the rural and coal mining sections. We propose to educate them—tell them of the natural beauty of the state—and impress upon them that the system of highways to be completed within a few years will make motor transportation really cheaper and more satisfactory to all concerned."—Charles A. Midelburg, Midelburg Garage, State distributor of Hudson and Essex cars, Charleston, W. Va.

Personal Visit Brings in Winter Service Work

C. W. BRAWBURN, of Bradburn Motors Co., Providence, R. I., agent for the Oakland car and Clydesdale truck, is unusually optimistic over the outlook for service station business during the fall and winter months. Bradburn is trying out a new system by which one of his representatives gets into personal touch with prospective customers. Bradburn explains the plan as follows:

"Our service manager is making a personal canvass of all owners of our vehicles within a radius of five miles from the center of Providence, giving to each enough time to go over the engine and body of the car with a view to checking up on its condition."

"He explains to the owner what he believes is needed at once in the way of repair work, and what can wait a month or longer, perhaps, but will be needed before spring. This service is given, of course, without charge. He urges the owners to take advantage of the slack repair season during the fall and winter

months, pointing out the fact that work done now must necessarily be of a more painstaking kind, because the men are not rushed with jobs that must be got out on hurry orders."

"Special efforts are being made to get back into the fold drivers who have not made use of the service station in recent months. The results have already proved the efficacy of the personal factor of the system. When this personal visit fails to show results, a letter, personal instead of circular, is sent out to the car owner. The letter calls attention to the visit of the service manager and cites the repair work that he had recommended. The owner is again urged to have the work done at this time, as a saving to himself will undoubtedly result."

"This is the time of year when we are also laying much emphasis on accessory lines. We have trained our salesmen to regard a contract for a new car as incomplete unless they have also sold complete accessory equipment for the vehicle. We find that customers who sometimes cannot be made to see the advantage of complete equipment, when purchasing a new car, will often return for one or

more of the accessories that the salesman has really "sold" but not clinched by his original effort. Considerable business results from replacement and repair of this accessory equipment."

Concentrates Circular Advertising Effort

THE Macon Truck Co., handling the Dodge Brothers car for Cincinnati, has just concluded a circular campaign among laundries, advertising their commercial automobile. Another campaign pushing the commercial vehicle is being carried on among the bakers, and when this is concluded, a campaign will be launched in which the advantages of the enclosed car model will be called to the attention of physicians. This special advertising will be carried on throughout the winter.

The first of November a sales contest will be started among the salesmen which, it is believed, will stimulate business to a certain extent.

A special series of circulars is now being prepared for service station customers and all Dodge owners.

Conducts Night School to Instruct Salesmen

EDUCATION of automobile salesmen is specified by L. A. Woodward, general sales manager of Richardson-Bower, Inc., distributor of Dodge Brothers automobiles in Salt Lake territory, as the key to successful selling of automobiles today.

"We are conducting a school one night each week in an effort to educate our salesmen to the most logical, scientific and practical way of selling motor cars. Our sales effort is concentrated on the number of owners, rather than on geographic distribution. Our best prospect is the man who has demonstrated his ability to own and use an automobile. We determine this by learning whether he has owned and operated a machine five years or five months."

"Immediate prospects are Dodge owners, and the next zone or class includes the owners of other four-cylinder cars in our class. Next come all the automobile owners in the county."

"We have 12 salesmen. Six are called scouts and six senior salesmen. I do not believe in junior salesmen. The scout salesmen are men who have at some time sold other merchandise and are ambitious to sell automobiles. The senior salesmen are the best in the business."

"The scout salesmen receive a proportionate number of prospects to call upon. They introduce themselves, inquire about

the automobile now operated by the prospect, its usage and service, and ascertain whether the prospect will talk new cars. Their reports are analyzed and the possible customers turned over to the six senior salesmen."

"Then follows a direct-by-mail campaign. The prospects are informed in five letters, alternated by personal calls, that the sales agent of the company will call. When he arrives he already has been introduced to the extent that the prospect is familiar with his name, his occupation, the organization and the car that he will try to sell. It is our aim to form as close a connection as possible between our cars, our salesmen, our customers and our organization."

"In this campaign we see 85 per cent of the owners in our territory. It is without doubt the most expensive kind of a campaign, but unquestionably the most effective."

"We have found with our methods that our salesmen take greater interest in their work. We sell them our plan of doing business, the Dodge Brothers product and the organization. In return for their better work, as the result of our weekly tests in the night school which we hold, we give them better salaries. The result is a mutual benefit and an assurance to us of a keen, efficient and reliable corps of employees."

Mr. Dealer *takes his* Pen in Hand

Not in Favor of the Flat-Rate Plan for Repair Charges

EDITOR, MOTOR AGE—If I properly interpret Mr. Chamberlain's thoughts, the substance of his defense of the "flat-rate" system, as applied to the repairing of motor cars, is that the element of time should not enter into the price of the repair operation, but instead, that the service station should charge for any operation any sum within reason it may elect. I take it that to him it is fundamentally essential that the fixed price is adopted, as he states that it (the fixed price) is "the fundamental law between merchant and customer and has been so for generations."

If this be true, and this law is applicable to the servicing of automobiles, why does not the service station employing the "flat-rate" system, to be consistent, quote their customers a fixed price—they only tell you what the labor component will be, and not the final bill. This being true, the flat-rate service station has not complied with Mr. Chamberlain's so-called fundamental law as it has not quoted a fixed price.

Now, the fact is the relation of service station to customer is not that of merchant to customer, but much more closely approaches the relationship of the manufacturer to his customer. A merchant vends that which is made by another and is sold him in its completed form—a manufacturer converts or rebuilds materials into an article for use—the latter is the role of the service station. A manufacturer cannot tell in advance the price of his product.

He must know first the required materials and the number of hours the manufacture will consume. He may approximate the price in advance, but if he does, he is guilty of business carelessness. Now the conditions facing the manufacturer are absolutely parallel to those facing the service station, for it cannot and never will be able to tell accurately in advance the materials and labor required—it may approximate but it will never be accurate. It can only guess.

Mr. Chamberlain states that his piano is invariably tuned at the same cost. This is true. Tuning a piano is a definite, specific operation; but I venture if Mr. Chamberlain's piano needed repairs to some diseased portion of its interior today and failed again to perform a month hence, the repair bills will not be identical—neither the labor nor the parts.

Mr. C. intimates that in the rate-per-hour method of charging, we have a very unscientific method of arriving at our per hour charge and that no provision is made for all the items comprising the true cost, and that no provision is made "for the actual service as well as the

after service." Permit me to point out that the rate-per-hour comprises many items of costs such as mechanics' wage, supervision, fixed overhead, loss in accounts, adjustments, advertising and profit, and many others, and there is no law which says that the sum of all of these must be \$1 per hour or \$1.25 or \$1.50 per hour. Make your rate what all the costs items actually total and you

What Do You Think of the Flat-Rate System?

SOME say it's the best plan for charging for repair work.

Some say the very nature of the work makes it impossible to work out a practical basis that will be fair to the customer and protect the repair-shop at all times.

Well, as Joe Bush says, one man's meat is another man's poison.

What has been your experience with the fixed-price plan and what is your opinion?

Your thoughts on this subject printed on this page may serve to solve the problem of a fellow businessman. Also, you may get some surprising answers!

Try it.

most assuredly provide for every contingency, profit included.

Mr. C. says that there are no injustices in the flat rate, and that I state in my previous communication that many injustices occur, but mentioned only one. I used that one instance only as an extreme illustration to bring out my point, but to my mind this variation occurs, only not to such a marked degree, in the vast majority of operations. Inquire of any service man the range of variation in installing and quieting rear axle gears or freeing the steering gear on, let us say, a Dodge Brothers car. Mr. C. says that if I will keep a record of twenty-five cars over a period of a year I will get some real information that will set my mind at rest. Now I have done this very thing and results were very disquieting. Every service man has remarked on the fact that certain owners' cars are constant visitors to the service station and others' at very rare intervals.

Now the fact is that the flat-rate exponents are trying to make the leopard change his spots. They are attempting to prearrange their charges as though

they were merchants; but the service station is not parallel to a merchant. It is a miniature factory, and factory methods should prevail. The merchant's method of charging is not applicable to our business—some service men, in a vain effort to satisfy the public, have turned to the flat-rate, and the motoring public, who is still in its swaddling clothes as regards the servicing of its cars, is perhaps temporarily appeased.

There is no practical service man in America who does not know that there are scores of operations on cars which cannot be done in even approximately the same amount of time, and to gloss this over by saying that we sell results, not time, it is only a quibble. Of course, we sell results, but it takes a variable amount of time to obtain these results, through no fault of the mechanic or service station, and it is only fitting and proper for the customer to pay for that which he actually receives.—Charles Goodlove, Goodlove-Pryor Motor Corp., Memphis, Tenn.

A Plan for Selling Used Cars

EDITOR, MOTOR AGE: There are at present thousands of used cars, the owners of which contemplate trading in on a new car, now or in the near future.

The used car market today is in worse condition than ever before. Valuation is based on the haphazard judgment of many individuals and no two appraisements are alike. In other words, the used car market of today is nothing more or less than a haphazard gamble, and so far no remedy has been found that will adjust this condition. Unless some means is adopted to do so, only a fool with money to throw away will attempt to appraise a used car this spring. So, for the purpose of establishing a system of standard values on used cars, this suggestion is made:

The dealers in each city should get together and organize a used car firm for the purpose of buying all used cars offered in trade on new stuff. No dealer should take in, or have on his floor, any used cars. The used car firm should have a building of its own with a manager in charge, the same to be on a salary. His necessary mechanics, painters and other staff may be employed by him and the expense prorated among the dealers. This basis for determining the used car value would be as follows:

Deduct 50 per cent of the retail price for the first year, 25 per cent for each additional year thereafter. For cars in exceptional condition and with good cord tires, 50 per cent for the first year and 20 per cent thereafter. Example:

A car purchased in 1919 at the cost of

\$2000 would be worth in 1920, \$1000; in 1921, \$750. If it comes in the exceptional class, the value would be \$800.

The actual cost of putting each car in salable shape should be charged to the selling price of the car. In a city of 20

dealers, the cost would be about \$100 per month per dealer. The firm should be under the supervision of the local association and should be checked up at least once a week. J. B. Doerr, Jr., Elder & Myer Motor Co., Wichita, Kan.

Missing on Sales Cylinders

EDITOR, MOTOR AGE: I am not a practical automobile man. No. I couldn't take a tire off and be sure I would get it back on straight. And as to carbureter adjustments—heaven forbid!

But I am an enthusiastic automobilist—when I can get hold of a car. And above all, I flatter myself that I am something of a merchant, as I've managed to pay my board bill for several years now. And so I think I know when I see a nickel rolling my way, and immediately make a few preparations to get my pocket in its path.

Hence this little article.

Not so long since I had occasion to make a trip over the Bee Line Highway, running from Nashville, Tenn., to Orlando, Fla. Now, the Bee Line Highway is pretty much like any other highway—better in spots, worse in others—854 miles of road linked together by the Bee Line Highway Boosters Association and enthusiastically proclaimed "the fastest road from the North to Florida."

It was in this role of tourist along this highway that my cupidity rose uppermost—and I began to figure. I talked to a good many garagemen and accessory dealers. I got their views of tourist travel. I saw some of them that were sitting idly on the workbench reading the morning paper while cars were rolling by on the way to Florida. I saw others out in front of the post office cussing the hardtimes and wondering whyinell things didn't open up. . . . And still the cars rolled by. And I saw still others busy at work on a little job that would probably have to be credit. (Garagemen still do a little credit business, don't they, Mr. Editor?)

And then it occurred to me that these men were not "cashing in" to the fullest extent on the efforts of the Bee Line Highway Boosters Association—though doubtless members themselves—to bring the Florida tourists over the Bee Line this winter instead of over some other line.

Tourist repair and service business, it seems to me, is mighty desirable business. That's not counting in bad checks, of course. In the first place, it's cash business; it's sales that HAVE to be made right now, before the driver can go any further; and while it's not exactly dependable business, it's pretty fair day-in-and-day-out work.

And so, thinks I, why were these garagemen sitting around like that and letting these tourists roll by to another town before they replenished their supply of gas and oil, or bought that extra tube that they thought they needed, or had the carbureter adjusted just a trifle? Little things—but part of a garageman's service.

It would be only too easy to stop them. I know. I got stopped once or twice. It was the "interrupting idea," as an advertising agency calls it, I believe, that did it. The garage man played on my weak spot. He caught me when he knew he had me. And he sold me what I needed.

What excellent opportunities some small-town garagemen pass up!

Take the Bee Line Highway, for instance.

Between Albany, Decatur and Cullman, Ala., there is a bit of uncomfortable road, a "punk stretch," if you please. Rocky, rough, washed out a bit in places, hard to maintain, no matter how much effort is expended. The Boosters are going to get rid of that stretch, but right now some garage men ought to be "cashing in."

The little town of Hartselle, Ala., is nearest that spot. There are a couple



of good garages there and it seems to me that a couple of attractive signs stuck up somewhere on that hill suggesting that the driver drop in and let a good mechanic look over his car or see that he has plenty of oil or gas, would bring in business.

Then there's another place on the Bee Line, a pretty good sized hill that only a mighty powerful car can pull on high. What would you do if you had shifted gears about halfway up and figured the ol' bus wasn't running well and thought maybe the spark plugs were not as clean as they might be, or perhaps it was the poor grade of gas—if you saw an attractive sign up at the top of the hill—not a "Ten Miles to Blank's Garage" sign, but a nice job of painting—a sign advertising piston rings that wouldn't leak or gas that gave more power or service in cleaning out spark plugs and

adjusting things in general—wouldn't that impress you just a wee bit?

Then take the case of the garage on Main Street. Every town has its Main Street, be it Birmingham or Bangor, Ala., Ozark or Orlando.

If you blew into a town and figured that you'd drift right on through—"Aw, shucks! another one of these little hick places where you can't get nothing!"—and there stretched all the way across the road was a sign saying "Ladies' Rest Room" or "Free Air" or "Selling Out of Tires"—wouldn't you stop?

After all, you've just got to stop the tourist to do business with him. The highway leads him to the town, and it will lead him on through unless you remind him of something that he thought of five miles back but doesn't remember now.

So I say, why not study the highway that leads by your garage. Find out wherein it's different from other roads. Ride over it yourself just as a tourist would, and make a note of what you think of as you hit certain stretches—(this doesn't include the vituperative vocabulary that sometimes rises to the motorist's lips when he hits certain stretches of road)—and then figure out how you can present your service to the tourist when he's passing those stretches.

I say there would be profit for you in that. Certainly you can help to make the tour more pleasant for the tourist, and he'll be only too glad to pay your just fee.

Aren't these suggestions practical, Mr. Garageman?

THAD HOLT.

Birmingham, Ala.

BRAKE TESTING DEMONSTRATION BRINGS BUSINESS

A unique automobile brake testing demonstration is staged in Spokane every Monday morning by the Spokane Auto Brake Shop here. More than two score of citizens' cars are tested out, free of charge, at each demonstration, for brake trouble.

Some of the steepest hills in the city are used in the demonstration in an effort to find faulty brakes.

"Approximately 75 per cent of the cars we test have faulty brakes," stated C. W. Finney, manager of the shop. "In most cases brakes have not been properly adjusted in the first place.

"Automobile brakes, as the cheapest and best insurance against loss of life by automobile accidents, do not impress the great majority of automobile owners as a real necessity," declared Mr. Finney. "As a matter of fact, 40 per cent of car owners think their brakes are right and are indeed surprised when they discover the danger."

LAMP GLASSES

It has been suggested that the present S. A. E. standard for lamp glasses be extended to specify the dimensions of the locking lugs of the head-lamp glass rim, so as to prevent the glass turning in the lamp, which is a matter of importance in other than plain lamp glasses.

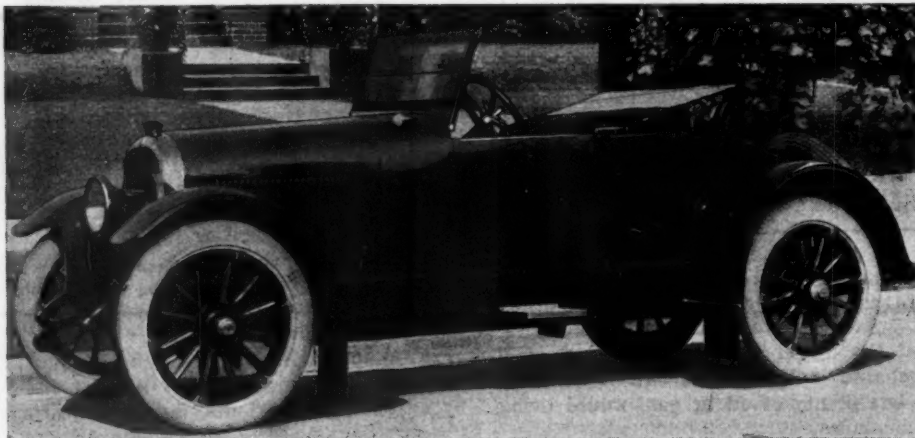
New Creations of the Designers

Sedan Added to Grant Special Line



THE Grant Motor Car Corp. has extended the line of Grant Special models to the enclosed cars, a new sedan and coupe, both selling for \$1,950, having been added. The standard line of enclosed cars selling for \$2,450 is continued, but disk wheels, spare cord tires, nickel rim barrel headlamps, and front

and rear bumpers have been added without increasing the price. The regular and special lines, both open and enclosed, are practically identical, with the exception of some changes in the running boards and fenders, the difference in price being chiefly accounted for in the difference in equipment.



Maibohm Sport Roadster Makes Its Bow

CRESCENT fenders with deep leather flaps and heavy ribbed aluminum steps instead of runningboards give the proper atmosphere to this Maibohm sport roadster. A newly-designed top which bends around to the windshield gives a

trim appearance. A compartment in the rear facilitates the handling of luggage. Non-skid cord tires are standard equipment, as also are anti-glare lenses. This model is priced at \$1395 f. o. b. Sandusky. The Maibohm Motors Co.

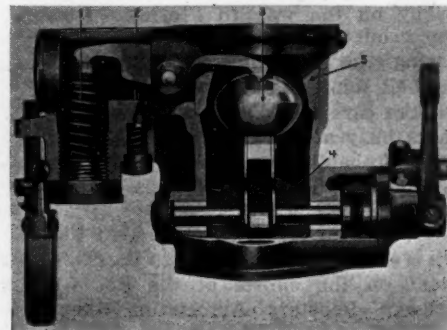
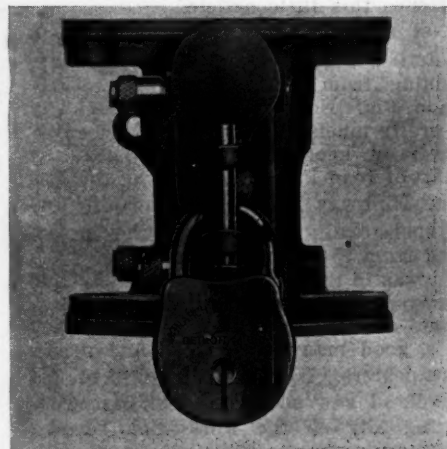
New Monarch Governor

A NEW model Monarch governor operating on the principle of utilizing the potential force of the moving gas in the intake manifold has been brought

out by the Monarch Governor Co. Detroit. The governor is distinguished by having only two moving parts and completely automatic action. Referring to the cross-

section herewith; the governor is shown to consist of a spring (1) with a rocker arm (2), and conoid (3), butterfly (4), and cone (5). The spring is of the conventional type and makes possible a wide range of governed engine speeds.

Adjustment is secured by removing the cap at the bottom of the spring housing and turning the slotted screw provided for this purpose. The rocker arm is provided at either end with a hardened ball point bearing that oscillates in a hardened steel cup. The rocker arm is mounted on a phosphor bronze bushing of large dimensions. The bushing is



lubricated by means of an oil cup and wick.

The conoid or governing members (3), in conjunction with the cone (5), controls the governor action. It is held normally wide open by the spring and the conoid is acted upon by the velocity of the explosive charge passing from the carburetor to the engine. The increase of velocity overcomes the resistance of the spring and causes the conoid to rise in the tapered cone, closing the butterfly to which it is connected. The butterfly shaft is mounted on two phosphor bronze bushings, and oil cup and wick lubrication takes care of these bearings.

While this principle is the same as the old model, there is no resemblance between the two in construction. Probably the chief advantage of the new model as compared to the old is that the spring tension or opposing force is now

applied through the conoid instead of through the butterfly, as formerly. This has resulted in a more efficient instrument with far less stress on the bearing surfaces and should result in a correspondingly longer life.

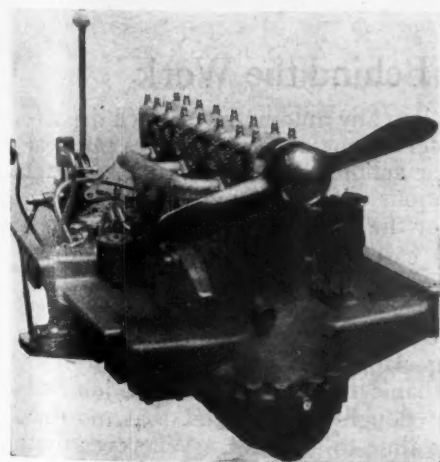
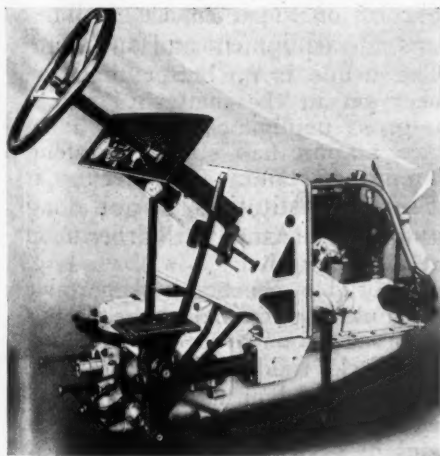
WING NUTS TO BE STANDARDIZED BY S. A. E.

THE Society of Automotive Engineers has been requested to formulate a standard for wing nuts, in order that designers may refer to a standard list and select sizes which meet their requirements.

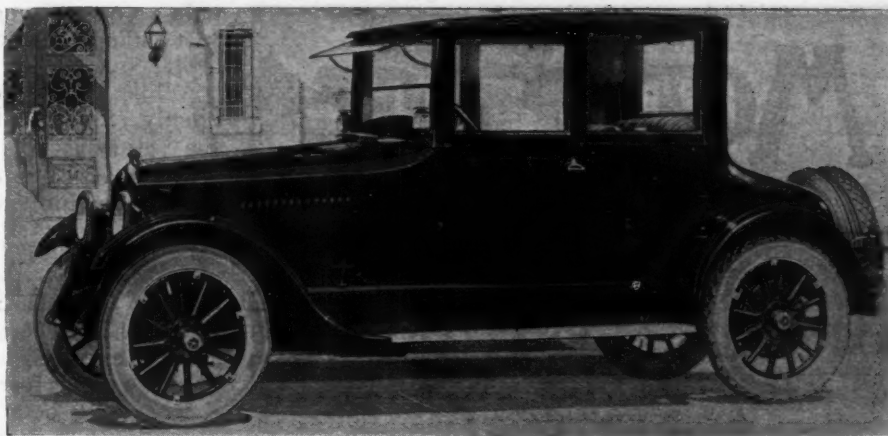
As it is recognized that the formulation of such a standard should be based on the best present practice, the S. A. E. is obtaining data on current practice for the different types of wing or thumb nuts and those standards which are in general use by small industrial groups such as bolt and nut manufacturers.

The adoption of a standard series of wing nuts will do much to decrease the cost of certain wing-nut sizes through greater production, and will ultimately result in discontinuing many special sizes.

New German Designs



AT the top is shown the Horch unit power plant with aluminum dash. This is one of the new German designs seen at the recent show in Berlin. The lower picture is that of the Swave all aluminum engine with overhead valves and wood propeller mounted on the camshaft.

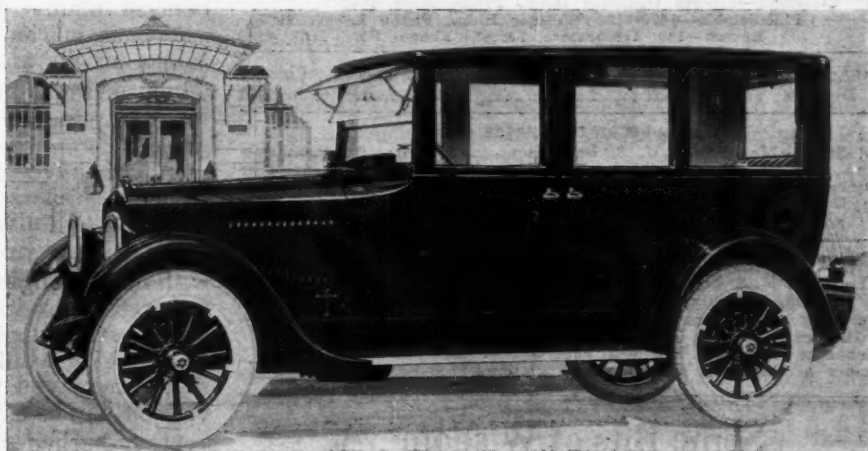


Studebaker Big Six Sedan and Coupe

THE coupe and sedan models shown above and below are now listed as stock models.

Formerly they were merchandised custom-built. The sedan has two folding seats which have been given special consideration as to comfort. The sedan is

sold at \$2950. The coupe, priced at \$2850, has one auxiliary seat also incorporating the feature of comfort. Both models have massive headlights, coach lights at the sides, interior cut glass corner lights, automatic window regulators and a ventilator in the cowl.

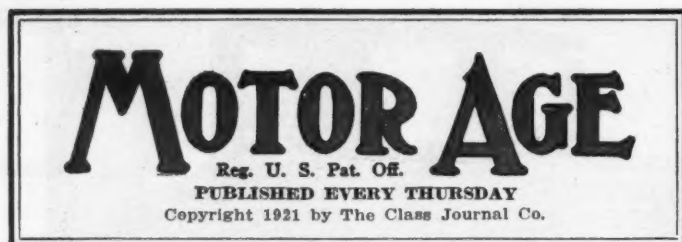


New Ranger Roadster Has Roomy Body



THE new Ranger roadster is mounted on the model A-20-4 chassis and is powered by the Ranger-Supreme engine. It has a roomy seat with large doors and compartment back of the rear seat for luggage. A choice of eight color combinations is offered the purchaser. This

roadster in standard blue-black or Ranger maroon lists at \$1,395, f. o. b. Houston. In a wide variety of colors with nickel trimmings and additional refinements, the roadster lists at \$1,545. Southern Motor Mfg. Assn., Ltd., Houston, Tex.



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Some Bits of Wisdom

AT the meeting of the Tractor and Thresher Department of the National Association of Farm Equipment Manufacturers last week, J. B. Bartholomew made some very entertaining remarks that had a wealth of business wisdom in them.

One remark was drawn forth by the comment that there probably would be a lack of hotel accommodations in Minneapolis during the tractor shows. Mr. Bartholomew belittled this suggestion, and said that so far as he was concerned he was not a bit particular about a room and bath, as he had found a demand for these accommodations was frequently fatal to business. He added: "When I was on the road, I used to hear my fellow traveling men talk about passing up a certain town because there was not a good hotel there. I made note of this town and went there at my first opportunity. Usually I had a clean sweep and did a good business."

Another remark that created considerable amusement in the meeting was Mr. Bartholomew's description of a man who could not sell goods because conditions were bad. He said: "During the recent months we have had a good many men come into our place and tell us that crops were bad, credit was worse, and to enumerate a long list of reasons why they could not sell tractors and farm machinery. Of course, we listened to these men and then said, 'Well, now, isn't that too bad? Of course, you cannot expect to stay on the payroll

unless you sell goods.' As a result, a lot of men have just talked themselves out of jobs and we did not care a bit."

While Mr. Bartholomew is one of those who quite openly expresses the opinion that the tractor dealer of the future is not the automotive dealer, he has in the above given some excellent advice to automotive, as well as to farm implement dealers.



Stabilizing the Service Industry

AT no time in the history of the industry has greater effort been directed towards the betterment of service, for never before have the leaders of the industry been so acutely aware of the need of stabilization. Heretofore there has been too much maneuverability and not enough stability. To secure stability, the unusual and the sensational in the production, the marketing and the maintenance of automobiles must be eradicated. The adoption of old line common sense business principles will eventually produce this condition. The adoption of the flat rate plan, which will undergo only detail revision, is a big step towards the realization of a feeling of mutual trust between the public and the industry.

The flat rate system is not a meager detail in the big general plan. It is one of the fundamentals. To deliver it efficiently, we must prepare internally. This brings us to a thought of our maintenance facilities which includes buildings and equipment and our maintenance personnel. The whole is no better than the weakest point of either; yet in the matter of equipment we have shown gross negligence. Many a so-called first-class service station has struggled along without a universal engine stand. Considering it closely, if the smallest service institution has got along without the engine stand, then the smallest barber shop can get along without a barber chair.

The same applies to portable benches and portable drills. You would not think of patronizing the barber shop where you were forced to undergo tonsorial service sitting in a straight back, rigid chair. Today the average barber shop has power-driven hair clippers and the barber is considered a true merchant. In the march of progress, the luxuries of yesterday are the necessities of today.



Thought Behind the Work

IT IS common to go into any automotive service department and there observe how some mechanics put real thought behind their actions, while others merely perform mechanical operations with no thought as to the why or wherefore of them or the lasting qualities of the job.

We believe in many cases where men are not putting real thought into their work, it is largely the fault of the organization. If the dealer does not care how unsystematically he carries on his service, he must not be surprised to find his men slapping out work after any-old fashion. When a mechanic talks about a repair job and says, "Oh that's good enough—let it go at that, no one will be the wiser," it is time to look out. Wherever that spirit exists and is allowed to go on, there is coming a big surprise for the dealer.

Men can be led, and mechanics are no exception. A good foreman can work wonders. Often the foreman is the dealer, especially in small service departments. If he has half a dozen men working for him and has shown them their importance to the organization, how their work counts in building good will and repeat business, how good or bad work will make or lose a customer and how

thought behind their work makes for better all around service, builds bigger business and fattens their pay checks, there can be only the reaction on the part of the men which makes for pride in the organization.



All Good Reading

IT is perhaps somewhat trite to mention that the readers of a business magazine should read it from cover to cover. The editorial department is always pleased and quite proud of the fact that so many of our readers write in and compliment us on certain articles and on the worth of the magazine in general. We are very glad to know that we are pleasing and aiding our readers, for that is our great object.

But, at the same time we are often more or less dismayed by letters which indicate that readers have not read all the articles in the magazine and still more often are we dismayed that they are not reading all of the announcements that are printed in our advertising section.

The writer recalls some years ago of reading a letter from a tourist whose friends had sent to him several copies of American magazines, which reached him in a foreign land. To save postage, the friends had torn from the magazines the advertising pages. The man who received them wrote back quite indignantly and said, "Don't you ever dare to send to me any more magazines with the advertisements torn out of them."

At that time the writer was rather surprised at this sentiment, but it was sufficient to attract his attention to advertising pages of magazines and so he learned that there was much of value in them. If this sentiment will apply to a general magazine, it certainly will apply to a business paper to a much greater extent.

It is a great pleasure to the editorial staff of MOTOR AGE to answer questions from the subscribers and readers of this publication. The fact that the answers to some of these questions have appeared before does not annoy us in the least, because we know of the great American habit of skimming through magazines and papers and we do not expect our readers to be 100 per cent perfect in reading all that is in them.

However, we sometimes wonder if the readers do their full duty by the advertising pages. Some of these questions are answered by our own reference to the advertising pages to the current publication. We believe that it should be a pleasure for the readers of MOTOR AGE to read the advertising pages, for in these pages he will find much that is of interest and importance. The mere fact that the reading of these advertising pages will reduce the volume of inquiries is not the object of the editorial department. The object is to call the attention to some of our readers to the interesting and important business information that is printed in the pages other than those of the editorial department.



Installation of Permanent Wiring Diagrams on Automobiles

PRIOR to about seven years ago, the mechanic working on a strange automobile engine was often confronted with a troublesome problem when an operation was performed that necessitated the removal of the ignition wiring, especially the secondary leads. In some cases where the wires had been destroyed, the man would be forced to grope around, watching the action of the valves in order to arrive at the correct firing order. Apparently the manufacturers became aware of this, and not long after, the custom of mark-

ing the firing order on the engine in some permanent way became quite common. Today practically every engine is turned out with this labor and time-saving information plainly in sight.

Statistics gathered from the American Technical Society and observation from our Readers' Clearing House show that the percentage of questions asked are very nearly 80 per cent electrical. Practically every question relating to electricity contains a sub-question asking for the wiring diagram of some particular car.

It would seem that it would be profitable to the manufacturer to treat the wiring diagram question in a somewhat similar manner to that in which the firing order markings were handled. The complete diagram could be printed on a metal plate; this could be screwed to the dash, instrument board or some other part of the chassis or body.



Thanking You for the Good Work

THE Townsend Highway Bill has been signed by the President. While it does not attain the ideal, none the less it marks a very decided advance in our national highway policies in that it requires that all future federal funds must be concentrated on main highways under rigid requirements both as to durability and maintenance. Funds can no longer be spread broadcast, and in all construction from this time forward the basic principle is recognized that, after all, a highway is of value only as it serves transportation. Full responsibility is lodged with the Federal officials.

There remains work to be done, of course. Increasing appropriations will be needed, and the effort to secure trained men to lead this work in county, state and nation must never cease. The whole subject of highway transport is as yet not fully analyzed, and in this field there is ample scope for educational effort in our universities and schools, as well as in the research laboratories of industry and government.

Meanwhile much has been accomplished in the two years and more of educational effort which has preceded the enactment of the Townsend Highway Bill. All of us have a better understanding of the fundamental relation between the vehicle and highway which spells highway transport, as well as a clearer appreciation of the marked effect which highway transport is having and will continue to have upon our national life.

The part which dealers' organizations and individual dealers have taken in urging this legislation is greatly appreciated by the national associations which have been active in pushing this measure before Congress. It is the request of the leaders that local organizations will always be interested when highway transport questions are at issue.



A Thought to Parking

THE inability of the car owner to park his car while attending to business in the main centers of the cities of the country is becoming of more and more importance to the car salesman. Only a few days ago a bell ringer for a Chicago company reported on a call he had made:

"She says that she will not consider the purchase of a car because she would not be able to use it in shopping and ordinary errands and calls about town. Prefers a taxi-cab."

How many dealers have interested themselves in local parking rules and in aiding the promotion of suitable parking places on vacant lots, holes in the ground and similar waste places? It is good business to be interested and it will make for better sales.

Bottom Reached — Trend Is Upward

Production Point to Touch Lowest Figures This Month

Factories Will Not Close—Early Pick-up Expected After First of Year

DETROIT, Dec. 2—Production in the Detroit factories, which has been falling somewhat steadily since Nov. 1, will reach its lowest figures this month, with certainty of an early pick-up following the turn of the year. There will be no closing of plants except for inventories at Christmas time, and the month will be devoted principally to preparing for production in January.

Virtually all of the factories in the district are working on a half-time basis, some with half the usual work force, some three days a week with full force, and some working half days only with full force. Dodge is working a close to normal force on engine assembly, getting ready for quick production in January.

Ford finished November with approximately 75,000 cars shipped and will continue into December on the same basis. The Highland Park plant will be closed for inventory at Christmas and production is expected to be cut previous to that date. Dodge has been on a 400-a-day basis since Nov. 10.

Maxwell, with its new models, is increasing its production 30 per cent Dec. 1, and will make continued increases. The factory is working full time and is gradually adding men. The Durant plant at Lansing will start production Dec. 20 on a 100-a-day basis and will continue at this rate until March 1.

Cadillac is leading General Motors units in production and is operating on virtually 100 per cent basis. Oakland is on a basis of 100 cars daily, working a full week. Chevrolet continues to be a steady producer in the light car field, and has suffered but slightly from seasonal depression.

Buick and Oldsmobile are operating at about half the rate of the third quarter, the former being on a three-day week. Hupmobile is producing at the rate of 50 cars daily and expects to build 1300 cars in December. Reo is working half days and is turning out about 100 cars and speed wagons daily. Earl Motors is operating steadily on about 60 per cent basis.

Hudson-Essex reports continued sales progress and expects to continue operation into December on approximately the November basis. Columbia, Liberty and Paige are making steady shipments, and with new dealers and distributors, look for gradual improvement.

Studebaker plants in Detroit and South Bend have been down for inventories in the past week and are now resuming, the

South Bend plant on Dec. 5 and the Detroit plant the week later. Practically 100 per cent production is looked for on resumption, November shipments approximating 3000.

Wills Ste. Claire has entered upon half-time operation for December. Packard reports continued large shipments in the light six model, with steady gains in truck demand. Saxon is operating strictly on a sales basis, and reports the signing of new dealers in many localities.

Makes 14,000 Weekly Calls Toward Sales Goal of 5000

Chicago, Dec. 3—The Dashiell Motor Co., Dodge Brothers distributors for Chicago and controlled territory, is continuing its house-to-house canvass with greater success than at any time since it was started last September. Last week the company's force of 26 canvassers turned in over 14,000 reports, each report representing a minute's interview during which some definite car sale information was secured.

Soon after the campaign was started, the Dashiell company officials made estimates of what they might expect in the way of results from the canvass. At that time it was estimated that five per cent of the prospects secured resulted in sales. This estimate after three months is holding good, and is considered by company officials to be the answer to the "law of averages." This percentage is expected to hold good all through the campaign, which at its height will return 25,000 reports a week, and adds something substantial to the claim that the campaign will produce 5,000 sales within a year of its start.

Steady Pick-up Features Milwaukee Parts Markets

Milwaukee, Dec. 5—The manufacturing situation in the automotive industries at the beginning of December is one of excellent prospect, compared with most other months this year. Makers of parts, engines, bodies and equipment look for a fairly active month, but the real optimism lies in the fact that orders taken during November and so far this month, for delivery beginning immediately after Jan. 1, are of a more encouraging nature and volume than since July 1.

ROLLS-ROYCE INCREASES OUTPUT

Springfield, Mass., Dec. 5—Rolls-Royce of America, Inc., after operating on a limited scale for two months, is increasing its factory force from week to week and is now turning out two chassis a week. The machine shop is again in operation, and the assembly force is much enlarged. It is expected that the normal rate of four chassis a week will be reached by the first week of January.

U. S. Says Credit Prospects Are Favorable to Industry

Officials Tell Alfred Reeves of N. A. C. C. That Conditions Are Generally Brighter

WASHINGTON, Dec. 2—Of the outstanding developments of conferences between Alfred Reeves, general manager of the National Automobile Chamber of Commerce, and government officials here today, was the statement that credit prospects for the automobile industry were distinctly favorable, and that standardization activities were progressing without detracting from the individuality of distinctive automobile types.

Reeves discussed the tax situation as it affects the automobile industry in detail with Secretary of the Treasury Mellon. It is expected that this conference will have much to do with the recommendations of this cabinet officer in the future, possibly at the next session of Congress, when an effort will be made to amend the latest tax bill and remove burdensome excise taxes from the automotive industry.

Seek Lower Production Costs

Governor Harding of the Federal Reserve Board gave Reeves an encouraging view of the general credit situation as it affected the industry. It is expected that money will be available at lower rates during the winter. At the Department of Commerce the automobile representative discussed standardization activities of the bureau of standards. He was told that the principal effort was directed toward the elimination of waste and, as a consequence, toward bringing about lower production cost. For instance, he was told of efforts to reduce the 10 or 12 sizes of steering wheels to four, which could be accepted as standard for the automotive industry. So far as Reeves could ascertain, there is nothing in the plan of the Department of Commerce to take individuality from our designs, but instead they are conducting a great work to save money for manufacturers, and, incidentally, increase sales through lower prices.

Conferences were also held with officials in the automotive division, Bureau of Foreign and Domestic Commerce, and plans were discussed for cooperation of the government with the industry in the promotion of domestic trade, as well as foreign business.

Reeves will confer with Senate and House leaders regarding the tax situation and other important problems of the trade. He is scheduled to speak before various civic bodies in this city during his visit, telling of the aims and achievements of the automotive industry.

Month's Opening Encouraging for 1922

November's Material Gain Points to Early Expansion

December Volume of Sales Promises to Approximate in Dollars Business of October

NEW YORK, Dec. 6.—The automotive industry has safely passed the lowest point of depression and the worst is over. November was the first month of the year to show an increase in shipments as compared with the same period of 1920. The gain was material and it is probable each succeeding month, until March 1 at least, will mark an equal or greater gain over the corresponding 30 days of the preceding year.

While there was a seasonal decline as compared with October, the falling off was not as great in proportion as it was in 1920. As December opens, the outlook is more encouraging than it was expected to be a fortnight ago. The volume of sales, chiefly because of the good demand for enclosed cars, will approximate in dollars the business for October.

Confident in Future

The stability of the industry is indicated by the fact that October was the eighth consecutive month to show only a slight variation in the volume of business done by the parts and accessory makers. There was a decline of less than five per cent as compared with September, and business has been much on the same basis since the end of February. It can be predicted confidently that the total of sales for November will show little contract, and it would be no surprise if the December showing was correspondingly good.

Manufacturers in both the parts and vehicle fields, whose financial affairs are on a reasonably solid foundation, can view the future with confidence. The volume of passenger car sales in 1922 will be fully as large as in 1921 and in the truck field they promise to be considerably better. Interest in highway transport, both freight and passenger, is steadily increasing. An interesting trend is found in the fact that both steam and electric roads are coming into the market with greater frequency for trucks and buses.

Stabilization of prices, both for the materials which go into motor vehicles and for the finished product, is one of the important problems confronting the industry, and there are increasing indications that costs are adjusting themselves to an era of keen competition. It is the general belief that another month will bring readjustments which will stand for some time.

All eyes are turned towards the New York and Chicago shows, which promise

the largest number of important announcements made at these expositions in years. An evidence of the public interest in automobiles is found in the large attendance at the New York salon, at which only high-priced cars were displayed.

A determined effort will be made at the coming session of Congress to have removed the excise or "stigma" taxes which the new tax bill contained on sales of automotive vehicles and equipment. It is expected also that the Graham joint resolution, which would impose a duty of 90 per cent on American-made surplus war equipment reimported from Europe, will be passed by Congress and cut off this unfair competition.

ITALIAN BUGATTI IN ENGLAND

London, Nov. 27.—(By mail)—The recent report that Willys-Overland-Crossley, Ltd., had taken over the manufacturing rights for the Bugatti cars in Great Britain was based upon misapprehension. The manufacturing rights for the popular Italian car have been obtained by Crossley Motors, Ltd., of Manchester. It is understood the two present Crossley models will be continued and that the Bugatti four merely will be added to the line. The English price of the small car, which it is hoped will satisfy the demand for a small car above the average, will be considerably below that of the imported Bugatti.

A. E. A. PLANS LABORATORY

Chicago, Dec. 2.—Plans under way at the national headquarters of the A. E. A. promise to establish under the control of the association at no great distance a laboratory in which replacement parts and accessories will be tested and the stamp of the A. E. A. placed on them. The idea in promoting this new feature of association work is to establish confidence in parts and devices bearing the A. E. A. mark. It is thought that this will aid greatly in merchandising the products.

FIRST RICKENBACKER CONTRACT

Detroit, Dec. 2.—Although well known dealers from all parts of the United States have been visiting the new Rickenbacker plant here for many weeks past, the first territory contract was signed yesterday and the honor was given to Harry L. Cunningham, of Detroit.

DURANT NAMES PRICES

New York, Dec. 5.—The following prices have been placed on the Durant six which will be made by the Durant Motor Car Co. of Indiana at the Sheridan plant in Muncie: roadster, \$1,600; touring car, \$1,650; coupe, \$2,250; sedan, \$2,400.

Big Guns Roar in Willys Corp. Receivership Battle

New York Bankers Secure Dismissal of Miniger and Kennison in New Jersey Court

NEW YORK, Dec. 5.—Efforts on the part of powerful banking interests to remove the receivership of the Willys Corp. from all possible influence of John N. Willys, met its first success when a group of New York bankers induced Judge Bodine sitting in the federal court at Newark, N. J., to remove C. O. Miniger and Frank P. Kennison as receivers of the property in that state.

The New York interests opposed to the receivership of Miniger and Kennison will appeal to Judge Kilharts, of Toledo, who appointed them, to remove them on the same grounds set up before Judge Bodine. Judge Knox of the Federal court for the southern district of New York has reserved decision on an identical motion.

It is claimed that these steps are the first in what promises to be one of the most hotly contested legal battles yet waged in the automotive industry.

Every effort is being made on the part of the Willys interests to save such units of the Willys Corp. as the New Process Gear and the Electric Auto-Lite, from participating in the receivership. Negotiations to reconcile the warring financial interests in Willys Corp. affairs have been unsuccessfully spread over eight or nine months. So far, Willys seems to have won a victory in that Miniger and Kennison remain as primary receivers as appointed by the Federal court at Toledo.

John N. Willys explained that the New York jurisdiction would deal largely with securities while the business end of the corporation is at Toledo. He said there appeared to be no impropriety on the part of the directors in making Toledo the primary receivership.

Willys said that the corporation would be able to pay all debts ultimately and that all shareholders have substantial equities to preserve. He pointed out that the treasury held assets of considerable worth, that the Auto-Lite and New Process plants were making money and that the reconstruction value placed on the plant at Elizabeth was \$10,000,000.

In the affidavit he declared that the 739,000 shares of Willys-Overland stock held by the Willys Corporation had a book value of \$18 at the present time and that an end to business depression would make this asset equal four-fifths of the corporation's total debts.

The New York bankers claim that they have loaned more than \$11,000,000 to the corporation.

Hoover Will Aid Industry Through Better Publications

Business Paper Editors in Conference with Secretary Secure Improved Reports

WASHINGTON, Dec. 2—Plans of the Department of Commerce to increase its usefulness to American business were outlined today by Secretary of Commerce Hoover and Dr. Klein, head of the Bureau of Foreign and Domestic Commerce, at a conference of these officials with members of the National Conference of Business Paper Editors, of which MOTOR AGE is a member.

Forty-six business paper men, including a number of publishers, spent several hours in conference with Secretary Hoover and his commercial assistant and also with Fred M. Feiker, assistant to the secretary. Discussion centered on two publications of the department—"Commerce Reports" and "Survey of Current Business."

"Commerce Reports," which formerly contained reports from United States consuls and attaches in various parts of the world, is being steadily improved in its usefulness to American business by getting better field reports from the department representatives abroad and by technically editing these reports when they are received. Circulation of this publication is now about 12,000 a week and it is desired to build it up to 25,000 or 30,000.

"Survey of Business," which has been coming out monthly with indexed tables of conditions in various business and industrial lines, is to be given more of an editorial than a statistical character from now on, except that each third issue will carry for a quarterly period the statistical information previously carried every month.

The editors made a number of suggestions for improving both "Commerce Reports" and "Survey of Business," and Secretary Hoover and his assistants agreed to carry them out.

Secretary Hoover gave some interesting information about the activities of the commodity chiefs of the department appointed under the new administration

to study American industrial and commercial conditions and cooperate with industrial and commercial leaders in improving them. These commodity chiefs are spending fully half their time in the field conferring with and assisting men in industry.

As an evidence of the demand for assistance from the government in directing individual business affairs, Secretary Hoover said that trade inquiries are now averaging 1,000 a day.

PRESIDENT AT N. A. A. C. DINNER

New York, Dec. 5—President Harding has been invited to speak at the annual dinner of the National Automobile Chamber of Commerce which will be held Monday evening, Jan. 9, while the automobile show is in progress here. The invitation has been based on the ground that the automotive industry is the second largest in the country and that the dinner would afford the president an opportunity to carry a message of good cheer to the country on the revival of business. A real turn for the better is expected soon after the first of the year. He has been told that the great transportation industry is filled with enthusiasm and that an address from him would inspire new confidence and determination to progress.

BIFLEX HOLDS SALES MEETING

Chicago, Dec. 2—On the eve of the convention of the Automotive Equipment Assn. in Chicago, the Biflex Products Co. held a salesman's convention at the new Biflex plant in North Chicago. The assemblage was also in the nature of a house warming, as the new offices of the company had just been completed. A dinner was served in the new offices.

MAIBOHM SALE POSTPONED

Toledo, Dec. 2—The reorganization sale of the Maibohm Motors Co., which was to have been held today, has been postponed until Dec. 12 because of the filing of a Federal tax claim.

DORRIS RAISES PRICES

St. Louis, Dec. 2—The Dorris Motor Car Co. has increased the price of its seven-passenger sedan from \$6690 to \$7190, effective immediately.

Railway Commission Ruling Favors Bus and Truck Lines

California Transportation Court Refuses to Restrict Operations That Parallel Railroads

SAN FRANCISCO, Dec. 2—Owners and operators of motor truck fleets and lines, and of passenger bus systems, are feeling much more secure in their investments as a result of a ruling just issued by the California State Railroad Commission, which has jurisdiction over all forms of transportation in this state. The ruling is to the effect that the commission will take no steps against motor truck and motor bus lines which parallel railroad lines, even though those lines are tending to put the railroads out of business. The commission also states that, if there is to be any fundamental change in the attitude and policy of the state toward such lines, and in regard to the free use of state highways by motor truck and motor bus companies, such change will have to come as the result of legislation, not as executive orders from the commission.

This ruling is important to the truck and bus line owners, because it means that the roads of the state are to remain open to these operators, and also is taken to mean that the State Railroad Commission will not impose extra taxes on the motor truck and bus lines for the upkeep of the highways. The statement comes as a reply to a letter written by R. B. Swayne, of San Francisco, to the commission, protesting the use of highways paralleling rail lines by motor trucks and passenger buses, and suggesting that the automotive carrier companies should not be allowed to do this. Swayne contended that this form of competition is unfair, because the motor companies make use of the highways built at public expense, and that they do not pay taxes in the same proportion as the railroads.

The commission's reply is long, goes into minute details of the situation, and seems to be the first statement of the kind issued by a transportation-controlling body in any state.

Delegation From A. E. A. Convention Photographed Before



On Monday, Nov. 21, the piston ring factory of the McQuay-Norris Mfg. Co., in St. Louis, was inspected by this party of jobbers and salesmen, who were invited down for the day from the A. E. A. convention and show at Chicago.

New Congress Offers Hope For Graham Tax Resolution

Measure Imposing 90 Per Cent Duty On Reimported War Equip- ment Gaining Favor

WASHINGTON, Dec. 5—With the convening of the regular session of the 67th Congress Monday, the National Automobile Dealers' Assn. and other organizations are hopeful that the Graham resolution, which would impose a special duty of 90 per cent on special war material reimported into this country, will be passed in the senate. Reports have been received showing that groups of American speculators have been rushing automobile trucks and other motor equipment into American ports in efforts to avoid these heavy assessments.

Senators who objected to this resolution when it was reported favorably from the senate finance committee have been advised of the situation and, as a consequence, have indicated that they will not oppose the resolution. It is becoming increasingly apparent that this protection must be accorded the American automotive industry at this time, because the permanent tariff bill will not be enacted until after the congressional elections next fall.

NEW ORLEANS SALES HOLD UP

New Orleans, La., Dec. 2—Leading automobile dealers here say that sales held up well, especially during the first three weeks of November. The fourth week was somewhat slack, with prospective purchasers more inclined to talk of awaiting until the first of the year.

New cars have been in better demand than used automobiles, the dealers say. Second hand machines continue to move slowly and the supply on hand still appears ample to preclude possibility of any early improvement in that line.

TRASK BACKS NEW STEAMER

Detroit, Dec. 5—Detroit Steam Motor Corp. has been incorporated under Michigan charter to manufacture a steam automobile in Detroit, the car to follow the best practices in steam car experi-

ences to date with a number of refinements both in mechanical features and design. The incorporators are O. C. Trask, president and treasurer; Paul C. Hayes, vice-president, and Willard K. Bush, secretary. Trask is a member of the firm of Trask, Kennedy Co., Michigan distributor of the Stanley. The company will have a capitalization of 300,000 shares of no par value common stock and 5,000 shares of preferred at \$10 a share.

The car will sell in the \$1,000 class and will weigh between 1,500 and 2,000 lbs. It will have a 110-in. wheelbase and will be built in four body styles—touring and roadster, sedan and coupe. First showings will be during the week of the Detroit show.

TWO FIATS FOR HOOSIER RACE

Paris, Nov. 22—Flat is expected to send two racing cars to Indianapolis next year in charge of Louis Wagner and Pietro Bordino. The Fiats are 183 cubic inch eight-cylinder in line engines built for the French Grand Prix of this year, but not ready in time. They have only been raced once, on the Brescia course, Italy, last September, when they established a world's road record, but were beaten by the Ballots over the total distance. The 183-cubic inch Fiats are the fastest racing cars of their capacity in Europe at the present time and undoubtedly will be dangerous contestants on the Hoosier track.

I. H. C. OPENS FOUNDRY

Springfield, O., Dec. 3—Owing to the booking of good sized orders for motor trucks and castings, the Springfield works of the International Harvester Co. opened its foundry Monday and it will be operated all winter, it is announced by Superintendent C. H. Smart.

DEALERS SOLD ON ENCLOSED SHOW

San Francisco, Dec. 2—San Francisco dealers have decided to make enclosed-car week an annual event in San Francisco. Though only two dealers decorated their salesrooms for this event this year, these two attracted so much attention and reported so much better sales as a result that the other dealers believe they made an error in not coming in.

Boston Dealers Unite in Fight Against Higher Fees

Public Works Commissioners Line Up Solidly—One Suggests \$300 Annual License

BOSTON, Dec. 2—Aroused by the repeated attacks being made upon motor vehicles, particularly the commercial vehicles, by people interested in railroads, and also the plan of Chairman John N. Cole, of the Department of Public Works, to increase the fees next year so that motor vehicle owners will pour more dollars into the state treasury, the Boston dealers have decided to band with other organizations and fight back.

Governor Cox, it is stated, told some of the dealers that it would not be good policy to oppose anything that Chairman Cole proposed to the legislature in the way of higher fees.

Following a meeting of the motor representatives they all went to the state house for a conference with the full commission of Cole, Synan and Kemp. At that conference all angles were discussed, including a gasoline tax. Finally Cole suggested that members of the motor delegation appoint committees to confer with him to "rearrange" the fees. That is equivalent to increasing them. Some idea of what the commission has in mind was cited by Synan, who said that if he had his way, all dealers would pay \$300 for their first set of plates, and \$100 for each additional set.

Cole said it would be no use to try to oppose higher fees for trucks anyway, as that was sure to pass. After considering the matter, the motor dealers declined to join Cole in revising the fees upward.

LOUISVILLE SPACE ALL TAKEN

Louisville, Dec. 2—Floor space for the fourteenth annual automobile show, to be held in the Armory, Feb. 20 to 25, was drawn for by members of the Louisville Automobile Dealers Assn. at a recent meeting. The floor space has all been taken. More than \$14,687 was guaranteed to the show by the bidding last night.

Executive Offices of the McQuay-Norris Mfg. Co.



The factory, with its electric furnace and its many other modern facilities for large production of piston rings, came as a distinct surprise to many of the visitors, and pictured to them vividly the increased demand for piston rings

Lincoln Seeks Vitiating of \$4,200,000 Additional Tax

Government Departments Disagree on Subject—Company Preparing Models for National Shows

DETROIT, Dec. 5—Details of the Lincoln Motor Co. inventory will be presented in Federal court here this week with recommendations by the Detroit Trust Co., receiver, as to the continuance of operations. The outlook for business is regarded as favorable and models are now being built for the New York and Chicago shows which will follow new lines in body work.

With the conclusion of the appraisal of the plant the receiver will request the Treasury Department to vitiate its claims for \$4,200,000 addition taxation, as it is held the appraisal will show that the valuation set by the War Department when the plant was taken over by the present Lincoln corporation was correctly based.

Counsel for the Lincoln company and for the receiver who have gone over the Treasury Department's claims, declare them to be in conflict with the position of the War Department. The amortization of the physical properties, it is declared, was in accordance with the plan followed out in the cancellation of war contracts, and they are confident it will be so regarded following investigation.

RECEIVER FOR GARY TRUCK

Gary, Ind., Dec. 2—G. H. Semmes, of this city, has been appointed receiver of the Gary Motor Truck Co., upon a petition filed by William H. O'Donnell, owner of 125 shares of preferred stock valued at \$12,500. The receiver was named by Judge Crites, of the Hammond superior court. His first official act was to close the plant here and announce that it will remain closed until he can "get a line on the business."

The capacity of the plant is ten trucks a day. The petition charges that no dividends have been paid for a year, that the company is insolvent and that it is unable to pay insurance or taxes. The books show a loss of \$80,000 from Jan. 1, 1921, to Oct. 31, and it is asserted that \$50,000 is due on a mortgage.

Frank Dawson is president of the company.

The stockholders have held a meeting, and as a result of it, notwithstanding the court order, it is believed the plant will reopen in a short time. F. R. Schaaf, bank president and president of the Gary Chamber of Commerce, has announced that his organization will support the company officials in efforts to resume operations.

OK BATTERY CORP. RECEIVER

Chicago, Dec. 3—On petition of the Indiana Box Co., East Chicago, a receiver was appointed Dec. 3 by the su-

preme court of Hammond for the OK Giant Battery Corp. The claim of the petitioner was for about \$300 for shipping boxes for batteries. The plan for reorganization includes a stockholders' committee to take charge of the plant as soon as the receivership is cleared up. A. G. Slocum, former secretary of the OK Battery Corp., is receiver.

Many Dealer Changes Mark Season's Close in Detroit

Detroit, Dec. 5—Earl Motors, Inc., will open a factory branch in Detroit, from which distribution will be handled for the State of Michigan.

Harry L. Cunningham, secretary-treasurer of the Rickenbacker Motor Car Co., has been named Michigan distributor for the car. From 1909 to 1918 Cunningham distributed Studebaker and Maxwell cars throughout the state. Since 1918 he has given all his time to the development of the Rickenbacker car.

M. S. Motor Co. has been formed to distribute Marmon cars in the Detroit district.

E. T. Fuller has taken over the Franklin franchise for the State of Michigan, formerly held by W. J. Doughty.

W. C. "Fuzzy" Anderson, former foreign sales executive for the Ford Motor Co., has organized the Anderson Sales Co., St. Louis, to market the new Brevard farm lighting system. Thomas G. May will be secretary of the company.

NOVEMBER SHIPMENTS GAIN

New York, Dec. 2—Preliminary reports received by the National Automobile Chamber of Commerce indicate that shipments of passenger cars and trucks for November will materially exceed those of November last year, but will show a seasonal falling-off as compared with last month. The showing is considered gratifying, because November is the first month of the year to show a gain as compared to the same period in 1920.

JENNINGS LECTURES TO STUDENTS

Syracuse, N. Y., Dec. 5—In the first of a series of six lectures on the subject of transportation, Clyde Jennings, managing editor of MOTOR AGE, addressed the students of transportation in the College of Business Administration, Syracuse University, Nov. 29. The speaker surveyed the whole history of transportation, emphasizing the motor truck and declaring its advent to be revolutionary in the distribution of commodities.

KELLY TRUCK ENLARGES FORCE

Springfield, O., Dec. 2—More men have been added to the force at the plant of the Kelly-Springfield Motor Truck Co. during the past week. There has been a steady flow of orders within the past few weeks. Prospects are that there will be a gradual increase in business from now on. Orders received recently have been mainly from the large cities, especially from the eastern section.

Conditions for 1922 Seem to Favor Tractor Selling

Farm Land Bank Loans Considered Factor by Manufacturers in Chicago Convention

CHICAGO, Dec. 3—The members of the Tractor and Thresher Department of the National Assn. of Farm Equipment Mfg. left their annual meeting here this week with a feeling that the corner had been turned, and that the business for 1922 was going to be much better than that of 1921. There were no dissenters to this opinion.

The meeting was rather notable for the frankness of the discussions, and the recent criticisms of the Minneapolis Power Farming Show and the Power Farm Bureau were repeated on the floor. Members personally came to the defense of the committees having these affairs in charge and a vote of confidence was given in each case. There is no doubt but that the Power Farming Show will be held Feb. 6 to 11, as planned, and that the exhibitors will be in greater volume than has previously been indicated.

William Black, president of the national association, in his paper on the 1922 outlook, pointed out many conditions that were unfavorable for 1921 are now much more favorable. He placed his strongest hope on the large volume of loans being made to farmers by the War Finance Corporation and the Farm Land Bank. This association is working very hard to spread throughout the country an understanding of these operations.

The reading of a paper on "Terms" by E. J. Gittins, developed a very strong sentiment in favor of maintaining the short terms established during the good selling years. A novel service plan was offered by G. M. Gillette, in which he advocated a common service station for communities where many tractors were in use, but not many of any particular make. He suggested that it might be possible to get an automotive service man to equip his shop properly for tractor service, and in this way a single high class and profitable service station could be established. Gillette, also, was appointed chairman of the committee to further this project. He will select his own associates.

Considerable time was given to a discussion of the present railroad and rate situation. W. H. Stackhouse and F. R. Todd were chief speakers.

The following officers, most of whom were re-elected, were named for the coming year: Chairman, Finley F. Mount; vice-chairman, George M. Gillette; secretary-treasurer, Edwin C. Merwin.

Executive committee: George M. Gillette, chairman; E. J. Gittins, J. B. Bartholomew, A. H. Gilbert, F. R. Todd, Grant B. Willis, C. S. Brantingham, Harry H. Bates, and W. R. Snively.

Cars Represent 3% Value: Pay 6% of State's Taxes

**In Face of This Fact Washington
Suggests Raising Gasoline Tax
1 to 5 Cents a Gallon**

SEATTLE, Dec. 2.—Pointing out that automobiles of this state already are paying 6.63 per cent of all taxes levied despite the fact that they constitute only 3.23 per cent of the total property valuation, the Washington Automotive Trade Assn. is vigorously resisting efforts to increase government charges on automobile possession and use. One particular object of the fight is a proposed four cent increase in taxation per gallon of gasoline, or from one to five cents.

Fred C. Chandler, speaking for the association before the State Tax Commission at Yakima, said questionnaires show that automobile vehicles increase the efficiency in farmers 68 per cent, salesmen 103 per cent, and doctors 104 per cent. In Washington there are 84 automobiles for each 100 farms. Ninety per cent of all automobiles are used, at least in part, for business purposes.

Washington, he pointed out, is already the fifth highest state in rate of license taxes on passenger automobiles, being exceeded only by Oregon, Vermont, Iowa and Idaho. Washington also levies a one-cent-a-gallon gasoline tax. Washington is raising for public highways this year \$1,204,815.76, Chandler added, plus \$1,800,355.50 for permanent highways, or a total of \$3,005,171.26. For the first nine months of 1921 the automobile paid in license fees \$2,880,477.02, and gasoline taxes up to Sept. 30 amounted to approximately \$269,500. This gives a total yield of \$3,149,977.02, or \$144,805.76 more than the state proposes to raise by general taxation for road work.

The aggregate of taxes to be paid by personal property in Washington in 1921 is \$14,635,180.69, and of this sum automobiles will contribute \$1,652,311.90, or 54 per cent of the total sum levied for state roads. This means that automobile owners will pay in excess of \$4,802,228.92 in special and general taxes, or 6.63 per cent of all taxes levied.

Chandler pointed out that all taxes levied by the state in excess of 2½ mills—the percentage set aside for highway construction—are used for other purposes. Summarizing, he said: "It would therefore seem that the present license and tax burdens upon the automobile are heavier than on any other class of property; that the license charges are in reality a tax on a utility because it is a utility; and that further imposition will be predatory and confiscatory. Instead of any increase there should be a decrease, and this commission should so report and recommend."

CAPITAL SALON SPURS DEALERS

Washington, Dec. 2.—One of the outstanding developments of the annual enclosed car salon of the Washington Auto-

motive Trade Assn. was the interest manifested by representatives of foreign nations in the latest and improved American models. Practically all dealers were enthusiastic concerning the winter season. The influx of society leaders from other cities for the purpose of joining in the social whirl incident to the conference has revived the trade.

Approximately 8000 persons attended the show. There were 41 exhibitors and 116 cars on display.

Rudolph Jose, chairman of the show, stated that the dealers had gained confidence as a result of their chats with thousands of likely buyers.

90 Per Cent of Tire Makers Favor Mileage Elimination

New York, Dec. 2.—Eighty-six tire manufacturers, representing more than 90 per cent of the total production in this country, have given their approval to the recommendation of the executive committee of the tire manufacturers' division of the Rubber Association of America for the elimination of mileage guarantees and the substitution of the new form of warranty. There has been considerable speculation concerning the probable course of the B. F. Goodrich company, which was one of the pioneers in the mileage guaranty movement, but this company is one of those which have approved the warranty plan and the elimination of guarantees.

ROCHESTER SHOW JAN. 16-21

Rochester, N. Y., Dec. 4.—The fourteenth annual Rochester automobile show, staged under the direction of the Rochester Automobile Dealers' Assn., will be held the week of Jan. 16 to 21, inclusive. The show will differ from those of past years in that it will be limited to the exhibit of passenger automobiles, motorcycles and accessories. This was decided upon to preclude the possibility of overcrowding when it was found that the exposition park buildings available for the show were too small to allow the display of trucks as well.

MUTUAL TRUCK SALE

Sullivan, Ind., Dec. 4.—The Mutual Truck Co.'s plant and equipment at Sullivan, Ind., will be offered at public sale by the receiver, Dec. 22. The sale will include 12 acres of land with siding to the C. & E. I. and Illinois Central railroads; a large modern brick building with steel truss roof; heating plant, machine tools, drawings, blueprints, and a miscellaneous stock of materials and parts for building a 2½-ton motor truck.

BILTWEIL IN CONGRESS

Chicago, Dec. 2.—A showroom in the lobby of the Congress Hotel will house the exhibit of the Leach Biltwell Motor Car Co. of Los Angeles, at Chicago, during the annual automobile show in January. Failing to get a satisfactory space in the Coliseum, the Leach officials decided to make their display in the hotel.

250-Mile Sweepstake Will Open San Carlos Speedway

**Dealers Offer Loving Cup as Perpetual Trophy; First Events
Set for Dec. 11**

SAN FRANCISCO, Dec. 2.—The San Carlos Speedway, the newest of the wood track bowls to be completed in California, has been completed and will be opened with a big race meet on Dec. 11. The track is oval, one and one-quarter miles in length, and the grandstands will seat 31,000 persons. Jack Prince, who built the Cotati bowl, is the builder, for a corporation of San Francisco capitalists and automobile men. Barney Oldfield, who is acting as scout for the new track, getting racing drivers to sign on the dotted line, probably will officiate as referee at the opening. The main race will be a 250-mile International Sweepstakes. The San Francisco Motor Car Dealers' Assn. has put up a loving cup as perpetual trophy for this race.

An unusual feature of the opening of the new bowl will be a dealers' 25-mile preliminary race, the first event on the program, and the first time that amateur drivers have been allowed to compete in a bowl track under A. A. A. sanction. The dealers, of course, will drive stock cars.

BODY BUILDERS' SHOW

New York, Dec. 2.—The Automobile Body Builders' Assn. has decided to put on a motor car body exposition in the Twelfth Regiment Armory, this city, Jan. 9 to 14. Although the show will run concurrently with the national automobile show, it will have its own distinctive features. One of the purposes will be to visualize the economic importance of the body builders as a group. Another will be to make it easier for automobile manufacturers by drawing up practical specifications and for the body engineers to adopt the most advanced ideas.

ELECTRIC LINE RUNS BUSES

Hartford, Conn., Dec. 2.—The Connecticut Co., which controls the trolley systems throughout the state, has installed bus service on Maple avenue for the benefit of residents of that section not reached by the company's trolleys. This is the second bus the company has put in operation, which is the most interesting fact for the reason that a private owner cannot operate a bus in competition with the trolley company if in the opinion of the public utilities commission the trolley company's revenue is interfered with.

BUS BUSINESS PICKING UP

Toledo, Dec. 2.—Motor buses on Toledo streets are carrying approximately 15,000 passengers a month at the present time. There are nearly 70 buses in service. Many developments are expected in the next few months.

IN THE RETAIL FIELD

Thomas Brooks, Inc., Detroit, has been named Elgin distributor for the Detroit territory. Brooks has bought the entire stock of the former Elgin distributor.

Basil W. Oge, Springfield, Ill., was awarded first prize in a six months sale contest arranged by the Milburn Electric Car Co.

Durant Motor Car Co. of California has opened an office in Portland, Ore., in charge of C. L. Dunham.

States Auto & Truck Co., Portland, Ore., will act as distributors of the Service truck.

Mack International Motor Truck Co., Seattle, Wash., will build a one-story masonry garage at a cost of \$100,000.

Wright Motor Sales Co., Inc., Wilmington, N. C., has taken over the local agency for the Chandler and Cleveland cars. The members of the company are William T. Wright, Willis B. Wright and Lawrence A. Dunn.

Joseph M. Schwab has opened a garage at Rock Island, Ill. Comfort and convenience for patrons and employees are features.

Thomas H. Smart Motor Car Co., Memphis, Tenn., has been appointed distributor of the Hupmobile for the tri-states. Smart recently occupied his new building.

Nelson Mitchell Co., Milwaukee, have been appointed distributors for the complete line of Mitchell motor cars for Milwaukee and adjacent territory. John E. Nelson is president of the new organization.

Hugh I. Smith, Cottage Grove, Ore., has purchased the Gresham (Ore.) branch of the Field Motor Car Co., where he will handle the Chevrolet.

Kalamazoo Auto Sales Co., for the past eleven years distributor of the Overland and Willys-Knight lines, has dropped those two makes and taken a distributor's contract for ten southwestern Michigan counties for the Durant Motors, Inc. H. B. Parker is manager.

J. M. Beach Co. represents the Lincoln line; Luce & Malloy, the Auburn, and Thomas M. Orrell Co. has taken the agency for the Overland and Willys-Knight, relinquishing the Olds to Hayes & Heavey. All are Kalamazoo firms.

W. C. Starr, Decatur, Ill., has been appointed distributor for Illinois by the Willys-Overland Co.

Aurora, Ill., Automotive Products Co. has been organized. The company is composed of E. F. Fagen, M. W. Cudding and V. C. Winkeweder. Capital stock has been fixed at \$50,000 and articles of incorporation issued. The company will deal in motor vehicles and accessories.

H. A. Mason, late of Beason, Ill., has purchased the garage of Eugene Rhoades of Mason City, Ill., and was given possession Dec. 1.

T. J. Kelly Co., Peoria, Ill., has been appointed distributor for the R. & V. Knight car in the central Illinois territory.

Pennsylvania Motors, Inc., just organized with O. W. Doolittle as president, has been appointed distributor of Rolls-Royce cars in Philadelphia and vicinity. The company is located on Chestnut street, at Twenty-first.

Chicago-McFarland Co. is the name of a new distributing company formed here by G. C. Buxton, president, and John Hammond, secretary and treasurer, to market the McFarland car in Chicago and territory.

Nelson-Mitchell Co., Milwaukee, has been organized by John E. Nelson to take over the distribution of the Mitchell Six in Milwaukee and Wisconsin. The line has not been directly represented in this territory since the March Motors Co. retired following the death of its owner, Alton J. March, a year ago.

Yahr & Lange Drug Co., Milwaukee, has taken over the Wisconsin distribution of the Corduroy Cord tire, made by the Grand Rapids (Mich.) Tire & Rubber Corp. It also handles the Columbia tire line and formerly distributed the Bergougagn tire. E. E. Gessert is manager of the tire and rubber division.

Osgood-Williams Co., Milwaukee, has been appointed distributor of the Garford truck in Wisconsin.

Republic Tire Co., Milwaukee, distributor of Republic tires, has changed its corporate style to Republic Supply & Rubber Co., having recently enlarged the scope of its operations.

Palace Garage at Antigo, Wis., is now operated by Schubert & Reed. Ernest Schubert has sold a half interest to Donald Reed.

Ashland Motor Service, Ashland, Wis., operated by Filltrault & Smith, has moved to more commodious quarters.

William F. Miller of Alma, Wis., has been appointed Dodge Bros. dealer in the greater part of Buffalo county.

Blodgett & Kavanaugh, Delavan, Wis., have disposed of their garage, sales and service business to Urban Welch, who established it and conducted the business until 1919 when the present owners took charge.

West Bend Oakland Co. has been organized at West Bend, Wis., to represent the Oakland and conduct a garage. John Van Blaricum formerly conducted a garage and repairshop at Beechwood, Wis., and Albert Davis owns the Oakland Garage at Adell, Sheboygan county, Wisconsin.

Motor Car Sales Co. has been organized by B. E. Siebert of Green Bay, Wis., to take over the representation of the Cadillac and Stephens Six in Brown county and immediate vicinity. Headquarters and service station have been opened.

O. H. Huelsman, Fond du Lac, Wis., proprietor of the Dodge Bros. agency, has taken over the former garage and service station of the George H. Scott Motor Co. The Scott company represented the Chandler, Cleveland and Hupmobile and is discontinuing business locally.

Tri-City Nash Co., Neenah, Wis., will build a new sales and service building, 60 by 133 ft., costing about \$35,000 equipped.

Parsons & Vertz, Ford dealers at Wausaukee, Wis., are building a new sales and service building, 55 by 140 ft., of which 35 by 55 ft. will be equipped for service and repairs.

Suelflow Garage, Hartford, Wis., owned and operated by Paul Suelflow, has been appointed Nash dealer.

Thon, Turner & Lanigan Garage Co. has been incorporated at Wausau, Wis., with \$25,000 capital, by Wells E. Turner, Alfred Lanigan, Louis Thon and George L. Ruder. It has purchased the building of the Wausau Motor Car Co.

Waldo (Wis.) Service Garage & Machine Co. has been established by Samuel Ogle and C. E. Broders, both of whom were formerly connected in engineering capacities with the United States Gearshift Co. of Eau Claire.

Palace Garage Co. of Marshfield, Wis., recently incorporated with \$40,000 capital by Paul, Peter and John Blum, has been appointed Buick dealer and will continue to represent the Franklin. The new company also has been appointed distributor in a large northern Wisconsin territory of the Stewart storage battery, manufactured in Marshfield by the Stewart Storage Battery Mfg. Co.

Williamson-Lexington Co., Williamson, W. Va., has recently been incorporated for \$50,000 to distribute Lexington Minuteman Six automobiles in seven counties in West Virginia, and to distribute the Chevrolet in Mingo county, W. Va., and Pike county, Ky. H. E. Stout, formerly with the sales department of the Lexington Motor Co. and the American Distributing Co., is manager.

Stevens-Duryea, Inc., have just announced the appointment of J. R. Norris, of Raleigh, N. C., as distributor of the Stevens-Duryea motor cars in North Carolina.

Frank and Kenneth Auten, Curran, Ill., have purchased the Duvan property on Perry avenue, that city, and will erect a modern garage upon the site.

Butler-Veitch, Inc., one of the best known automobile merchandising firms on the Pacific slope, has been appointed northern California distributors of the Marmon. This company has been handling the Fageol truck for all the Pacific coast. A few months ago it took on the Dort for northern California.

SOUTHERN DISTRIBUTORS MEET

Atlanta, Ga., Dec. 6—Encouraging reports of Willys-Knight and Overland sales in the southern field were made by distributors who gathered in Atlanta recently for the first dealer meeting in the newly created district of Willys-Overland, Inc., of which Atlanta is the central distributing point.

LANSING ASSOCIATION ELECTS

Detroit, Dec. 5—Lansing Automobile Trade Assn. at its annual meeting elected John Bohnet, president; George F. Conway, first vice-president; W. V. C. Jackson, second vice-president; T. C. Gross, treasurer, and Arthur N. Avery, secretary and manager.

Dealers' Ads Are Backed by Paper in Used Car Campaign

This Corporation Regarded as Strong Sales Influence by Trade in Milwaukee

MILWAUKEE, Dec. 5—The merchandising of used cars is occupying more than the usual amount of attention among Milwaukee dealers because of the presence of the heaviest stocks of such vehicles that has yet been held here. Competing against the established dealer trade are a large and growing number of "Used Car Exchanges," which merely keep used cars moving, although in some cases dealers have arrangements with such exchanges to market their intake of used cars on new car sales.

The newspapers are cooperating with the trade in facilitating the movement of used cars.

A conspicuous example of cooperation was furnished by the "Milwaukee Sentinel," the only morning daily, in its Sunday issue. Prefacing the first of the want ad pages devoted to used cars, the newspaper devoted a half-page to an introductory display, headed:

"The Element of Risk Eliminated: The purchase of an exchanged car no longer a game of chance."

It then said:

"Whenever a thoroughly reliable firm offers an exchanged car for sale in the columns of this newspaper, the obligation assumed by this firm is fully understood. Such a firm stands ready to substantiate any statement made in the ad."

"If a reliable firm advertises a car to be in perfect condition, you may be reasonably sure that the car has been thoroughly overhauled and tested."

"Prices of all standard makes of cars have reached the prewar level. Our prices on used cars have dropped accordingly. A careful survey of prices quoted in the advertisements below prove this fact beyond a doubt."

Below and on following pages were grouped the used car ads of nearly every Milwaukee dealer of recognized standing. There were more candid statements than the general run of such ads, due doubtless to the implied responsibility of the introductory display. Both factors are regarded as holding out excellent influences upon the public mind with respect to used cars.

DEALERS OPEN TRACTOR SCHOOL

Monticello, Ill., Dec. 4—Tractor dealers of Piatt county, Ill., are not asleep during the winter months. They believe that farmers will buy power machinery next year and that it is worth while to go after prospects now. An instructor in farm mechanics from the University of Illinois has been engaged and he will deliver lectures on the ignition and will also take down and assemble various makes of tractors. The school will be held at Monticello, the county seat.

Truck Transportation Costs Theme of Federal Inquiry

Commission Will Investigate Every Phase of Distribution in United States

WASHINGTON, Dec. 5—Investigation into costs of distribution by motor trucks and cars will be undertaken immediately by the Joint Commission of Agricultural Inquiry of Congress. Chairman Sidney Anderson has announced that a committee representing these shippers would be appointed at an early date, as one of the 44 committees of shippers named in conjunction with the executive traffic committee of railroads, for the purpose of obtaining data on marketing and transportation facilities. These groups represent 95 per cent of total tonnage of land and water carriers.

In addition to inquiry into motor haulage costs, the commission wants information as to comparative freight charges from electric and water carriers. These committees have been asked to report by Jan. 1, when their work will be reviewed and analyzed by an advisory committee of 12 members. F. E. Todd, vice-president of Deere & Co., Moline, Ill., represents the agricultural implement industry.

Undoubtedly, if the commission adheres to its present policy, the inquiry into motor haulage will involve costs of trucks under pre-war, war and post-bellum conditions, costs of repairs and average earnings of fleet operators, as well as individual owners.

The commission explained its attitude, as follows: "Every phase of distribution is being investigated in relation to transportation.

"This investigation involves physical property, transportation service, the economic relation of transportation to agriculture, and industry, and the administration of transportation to the analysis of state and federal laws, applying to transportation. A study is being made of the relation of car service and supply and the successful distribution of products, with particular reference to the condition of equipment. It can be conservatively stated that 15 per cent of the equipment of the railroads is in poor condition."

In a statement, Chairman Sidney Anderson said:

"The costs of distribution were increased slowly but steadily, prior to 1913. So far as we can ascertain, they have about doubled since 1913, and today the costs of distribution represent about one-half of prices which the final consumer pays. These increases in costs do not occur in any one place in the line of distribution. They occur as a part of the price of every element of service performed in connection with the distribution of the product, all along the line. This means that the spread between the producers' and consumers' prices, must, for the most part, be re-

duced by more efficient methods of distribution; by reducing unnecessary transportation hauls; by more efficient merchandising methods; by more closely relating output to markets; by speeding up turnover; by reducing unnecessary stocks, and otherwise shortening and speeding up the steps between the producer and the consumer."

Overload Allowed in Nutmeg State If Extra Fee Is Paid

Hartford, Conn., Dec. 2—As a result of the rigid enforcement of the law limiting truck loads to rated carrying capacity hundreds of requests have been received by the state authorities from truck operators asking permission to overload their machines beyond the rated capacity, most of them setting forth for example that a 3½-ton capacity truck will in reality carry five tons safely.

However, a joint ruling just issued by the two state departments shows a way out for those truck owners whose machines will safely carry the overload. Under the new ruling the state highway department will re-register motor trucks to carry as much weight over their rated capacities as the respective manufacturers will certify to. This puts the responsibility on the truck builders. The Packard and Pierce-Arrow companies promptly acted under the new ruling, certifying that their 3½-ton trucks will safely carry five tons. Accordingly, the department began re-registering trucks coming under these two makes for the various owners. All owners may do the same thing as soon as the manufacturers certify safety in overloading.

EXPORT SALES INCREASING

Toledo, Dec. 2—The last quarter of this year will see a total increase of between 100 and 175 per cent in the export sales of Willys-Overland cars, officials of the John N. Willys Export Corp., now located here, believe. Figures at the close of the year will show that about 60 per cent of foreign business has been done in these last three months of the year.

MEET IN BAKERSFIELD

Bakersfield, Calif., Dec. 7—Bakersfield was the Mecca where the automobile men of California journeyed on Dec. 5 and 6 to attend the general convention of the California Automobile Trade Assn.

October Accessories Fall \$1,000,000 Below September

Eight Months of Year Show Almost Equal Volume; June Only Decrease

NEW YORK, Dec. 2—Sales by members of the Motor & Accessory Mfrs. Assn. for October showed a falling off of approximately \$1,000,000 as compared with September, but the decline was less than 5 per cent. This showing was much more satisfactory than was expected, because it was believed production of motor cars last month would be considerably curtailed.

It is a striking commentary on the stability of the automotive industry that October marked the eighth successive month in which the volume of business of the parts and accessory manufacturers was practically the same. Beginning with March, which showed a gain of 93 per cent as compared with February, the greatest fluctuation for any month was in June which showed a decrease of 15 per cent over May. Increases were reported in July, August and September, but the change from the preceding month in each instance was less than 2 per cent.

The total of notes outstanding reported for October showed a decline of 5.82 per cent. This reduction was almost identically the same as was reported in August and September. The figures for each month this year will be found in the table at the foot of this page.

OLD TIMERS' ANNUAL DINNER

New York, Dec. 5—The Old Timers' Club, which was reorganized last year during automobile show week in Chicago, will hold its first annual New York dinner Monday evening, Jan. 9. This meeting promises to be a distinct novelty, since the "SS. Flotilla," New York's most novel restaurant, has been engaged exclusively for the Old Timers and their guests.

BALL BEARINGS IN DEMAND

Philadelphia, Dec. 2—Indications of improvement in the automobile business come from the manufacturers of ball bearings. They report that for the last few weeks orders from motor car makers have been coming in good volume, although deliveries are not specified in most cases before the first of the year.

Industry's Stability Shown Here

Month	Total Purchases	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	\$ 6,264,587	-----	\$8,099,727	-----	\$4,359,871	-----
February	10,408,962	66.15*	6,717,165	17.07†	6,063,118	39.03*
March	20,120,386	93.30*	5,603,992	16.57†	5,069,887	16.33†
April	26,746,580	32.93*	5,352,271	4.49†	5,371,086	5.94*
May	26,781,350	.13*	4,505,176	15.64†	4,460,355	16.77†
June	22,703,414	15.19†	4,720,973	4.79*	4,012,670	10.37†
July	23,096,214	1.68*	5,242,046	10.79*	3,690,154	7.90†
August	23,397,640	1.31*	4,348,790	17.06†	3,494,510	5.30†
September	23,141,891	1.09*	4,358,545	.22*	3,677,500	5.24*
October	22,053,327	4.70†	4,512,680	3.54*	3,463,500	5.82†

*Increase. †Decrease.

BUSINESS NOTES

American Carburetor Co., Vancouver, Wash., has been incorporated by W. H. Slayton, H. R. Saltmarsh and John Wilkinson, at \$400,000.

Corinthian Motors, Inc., Philadelphia, incorporated under the laws of the state of Delaware, will manufacture the Corinthian, a four-cylinder passenger car equipped with a Wisconsin motor. The company is directed by Charles B. Lewis, president and engineer, formerly of the Lewis Motor Truck Co., San Francisco.

Rotary Tire & Rubber Co., which had a large tire making plant in Zanesville, O., has been reorganized under the direction of the Studebaker-Wulff Rubber Co., which has general offices in Columbus, O.

C. G. Spring Co., Kalamazoo, is experimenting with a new type of bumper designed for use on the package freight trucks.

Signal Motor Corp. has filed articles of incorporation and will continue manufacture of the line of trucks formerly made by the Signal Motor Truck Co. at the Detroit factory.

Precision Stud & Bolt Co., Milwaukee, has increased its capital stock from \$20,000 to \$40,000. The new issue will be used to finance enlargement of the business in a general way.

Holm Radiator Corp., Milwaukee, manufacturer of radiators for passenger and commercial cars, tractors, farm lighting plants, etc., has been declared a bankrupt and Victor L. Gleans has been placed in charge of affairs, as trustee. Liabilities are given as \$36,118 and assets of \$67,244 are claimed.

Nelson Machinery Exchange, Green Bay, Wis., has broken ground for a two-story addition, 40 by 100 feet, to be used as display rooms and offices.

Mitchell Motors Co., Inc., Racine, Wis., has temporarily reduced its force from 60 to 70 per cent in order to facilitate inventories and balancing of stocks.

International Steel Products Co. of Hartford, Wis., the principal line of production of which is mufflers and silencers for internal combustion engines, is enlarging its line to compensate for the rather slack demand for the automotive specialty.

Super-Traction Truck Co., of Fox Lake, Wis., incorporated a year ago with \$300,000 capital, to build six-wheeled motor trucks, is negotiating with the new industries bureau of the Association of Commerce of Fond du Lac, Wis., with a view of establishing the permanent factory and offices in that city.

Ft. Wayne Dealers Advocate Broker Plan on Used Cars

Fort Wayne, Ind., Dec. 2—Discussion of a no-trade policy on used cars was taken up by the board of directors of the Fort Wayne Auto Trade Assn. this week. Various ways of solving the used car problem in Fort Wayne have been before the association. Wide interest was developed here in the Indianapolis policy, but a half dozen of the dealers have become strong advocates of a no-trade policy. There is strong indication that the no-trade idea may be put through within a very short time. On this basis, the association dealers would simply refuse to make any allowance for the old cars, requiring full payment for new cars, and act as a broker, selling the old car for the customer on a commission basis.

HARES TO SELL THOMART TRUCK

New York, Dec. 6—Hares Motors, Inc., has practically completed negotiations with the Thomart Motor Co. of Kent, under which it will take over sales of the Thomart truck.

President Thompson of the Thomart company, in announcing that a contract had been agreed upon, stated that the plant at Kent would be placed on a

Milwaukee Tool & Forge Co., Milwaukee, has amended its corporate articles to provide for a capital increase from \$25,000 to \$50,000 and a change of location to South Milwaukee, Wis.

Geuder, Paeschke & Ftey Co., Milwaukee, has recently increased its authorized capitalization from \$1,000,000 to \$2,000,000. It is a large manufacturer of steel stampings, sheet metal goods, enameled utensils and other ware, and is the exclusive maker of the Maxim Silencer. Charles Paeschke is president.

Alger Mfg. Co., Port Edwards, Wis., has incorporated with \$50,000 capital, to engage in the manufacture of automotive equipment, accessories, parts, etc.

Gold Seal Battery Co., formed in Green Bay, Wis., about six months ago, has incorporated with an authorized capital stock of \$100,000. A plant has been established and is now in production on storage batteries.

American Metal Parts Mfg. Co., Milwaukee, manufacturing parts and specialties for machinery, motor vehicles, etc., has increased its capital stock from \$100,000 to \$200,000, to accommodate the growth of its business.

Independent Truck Body Co. is the name of a new Milwaukee corporation organized with \$30,000 capital stock, to manufacture and deal in bodies, cabs, tops and other motor truck equipment.

United States Radiator Corp. has been organized at Milwaukee and incorporated with an authorized capitalization of \$8,000,000, of which \$4,000,000 is preferred and the remainder common stock. The incorporators are J. H. Cole, E. L. McNair and W. C. Mosher. Specific details of the enterprise will be given out shortly.

Controllable Auto Light Co. has been organized at Jackson, Ill., by Christopher Anderson of that city; J. R. Mitchell of Alton, Ill., and T. F. Dehr of Hinsdale, Ill. Articles of incorporation have been issued for a \$50,000 stock company and the manufacturing of a new type of motor vehicle lamps will commence shortly.

L. H. Earle, eastern sales manager, engine division, for the Buda Co., has moved his office from 1216 Aeolian hall, 33 W. 42nd street, New York City, N. Y., to 30 Church street, New York City, N. Y.

Wayne Oil Tank & Pump Co., Fort Wayne, Ind., has bought the Borromite Co. of America, of Chicago, for \$500,000. Wayne Oil has taken over the Warriner Manufacturing Company, of Fort Wayne.

highly efficient basis to meet the increased business which is expected. The company makes a light speed truck.

The fact that Hares Motors is taking on this new line will have no bearing whatever on the continuance of its selling arrangement with the Kelly-Springfield Truck Co.

L. H. C. STARTS TRUCK PROJECT

Fort Wayne, Ind., Dec. 2—Work has been commenced by the International Harvester Co. on the construction of a \$150,000 sewer in its 150-acre property just east of this city, where the concern plans to erect the largest truck plant in the world. It is expected that the sewer will be completed in time so that the actual work of construction on the factory buildings can be started about the first of March.

INSURANCE COMPANY FAILS

Des Moines, Dec. 3—The Interstate Automobile Insurance Co. of Rock Rapids has gone into the hands of a receiver. E. H. Hoyt, former state treasurer and now president of the Solidarity Finance Co. of Des Moines, has been named receiver. The Interstate's liabilities are given as \$930,000, including \$200,000 capital, and its assets as \$681,000, making a deficit of \$239,000.

November Business Points Toward Economic Recovery

Trade and Industry Situation More Hopeful and Improving, Says Federal Reserve

WASHINGTON, Dec. 2—Encouraging indications of progress toward normal conditions in November are noted by the Federal Reserve Board in its review of the business and financial situation. The board says:

"The general situation of trade and industry is unmistakably more hopeful and is improving as steadily as can be expected in view of the slowness of economic progress in other parts of the world, particularly in western Europe. Another handicap to complete readjustment continues to be the failure to bring about a proper coordination and mutual relationship of prices. This is responsible for no small part of the slowness of economic recovery in certain branches of business. On the whole, the best opinion now looks to the steady, even if locally interrupted, progress back to normal conditions, although no immediate or sudden expansion or boom is now in sight."

PORTAGE GOES TO SEIBERLING

Cleveland, Dec. 2—Another important step was taken by F. A. Seiberling of Akron, toward reentering the rubber industry in an impressive manner, when Federal Judge D. C. Westenhalter, in this city, approved the sale of the Portage Tire & Rubber Co. to Seiberling.

The Lehigh Tire & Rubber Co. of New Castle, Pa., which Seiberling also controls, will be incorporated with a capital of \$750,000 in common stock.

The new Seiberling Rubber Co., which was incorporated a short time ago with a capital of \$10,000,000, will take over the common stock of both companies and assume control of them.

Seiberling will introduce a new cord automobile tire with new tread, designed and built along different basic principles. His factories will at the start have a capacity of 5000 tires and 6000 tubes daily.

SEATTLE REBUILT CAR SHOW

Seattle, Dec. 3—This city's first Rebuilt Auto Show, held recently, convinced approximately 2000 persons of the merits of the made-over car, brought 12 leading dealers into a cooperative movement which may later embrace the entire automobile section, proved the efficacy of the "bargain basement" for automobile turnover, and resulted in sales totaling \$23,785.

NEW ASSOCIATION FORMED

Dyersburg, Tenn., Dec. 2—Automobile and accessory dealers have formed an association here. At a luncheon held recently officers were elected and committees appointed to make by-laws, constitution, etc. All dealers in the city have joined the new organization.

CONCERNING MEN YOU KNOW

Robert McLaughlin, founder of the McLaughlin Carriage Co., Ltd., at Oshawa, Ontario, which later became the nucleus of the General Motors of Canada, Ltd., is dead at his home in Oshawa.

James L. Geddes, chairman of the board of the Kelly-Springfield Motor Truck Co., is greatly improved in health. While he is not yet able to return to his office, he is much better. Geddes was taken ill about three weeks ago.

Paul Runyan, advertising manager, Westcott Motor Car Co., Springfield, O., has resigned. He is succeeded by Karl A. Heinsen, former newspaper man, who has been acting as publicity man for the Westcott company.

W. L. Derry, Vermont, Ill., for many years president and secretary of the Illinois Implement & Vehicle Dealers' Assn. of Illinois, and who was also prominent in the national association, died at his home Nov. 20.

Ralph M. Ware, Hartford, Conn., for many years with the Cadillac sales department of Brown, Thomson & Co., accepted a sales position with the Acme Motor Sales Co., Hartford, Conn., Marmon distributors.

T. H. McDearmon, who has been the manager and a director of the Nash Sales Co. for the past four years and a half, and who opened the Omaha branch for the Nash Sales Co., has sold out his interest in the concern and has resigned his position. He is succeeded as manager by George W. Andrews, who has been assistant manager of this business for the past two and one-half years.

Sherman Goes West On "Ask 'Em to Buy and Pay" Trip

Chicago, Dec. 2—Ray W. Sherman, merchandising director of the A. E. A., left Chicago last night on a trip covering all the principal cities of the west and a number in Canada. On this trip Sherman will address for the most part jobbers' salesmen, carrying to them his great idea of "Asking 'Em to Buy." To this will be added a newer thought, "Ask 'Em to Pay," and the suggestion of emphasizing automotive accessories as Christmas presents. Following the Salt Lake City meeting on Dec. 3, Sherman will speak in the following named cities: San Diego and Los Angeles, Dec. 5; Bakersfield, Dec. 6; San Francisco and Sacramento, Dec. 7; Portland, Ore., and Tacoma, Wash., Dec. 9; Seattle, Dec. 10; Spokane, Dec. 11; Calgary, Canada, Dec. 14; Regina, Sask., Dec. 15, and Winnipeg, Dec. 16.

Sherman says that his department will make an effort to cover every automobile show, large or small, in the United States, and that his message will be carried into every town where there is a jobber. The detail of keeping track of the shows and finding speakers for all the proposed meetings will be looked after by the state vice-presidents, who were appointed at the recent convention of the A. E. A. Under the plan worked out, it will be possible to supply a speaker for any meeting anywhere on very short notice.

BURKE WITH NEW YORK DURANT

Muncie, Ind., Dec. 4.—D. A. Burke, who purchased the Sheridan Motor Car Co. from the General Motors Corp. with W. C. Durant and associates a few months ago, has sold the major portion of his holdings to the Durant Motor Co. of Indiana. He will continue, however, to be a stockholder in the Indiana com-

Charles Addams, formerly a sales engineer with the Standard Roller Bearing Co., of Philadelphia, Pa., has since Nov. 1 been identified with the Bearings Co. of America as sales engineer in the eastern territory.

J. H. McDuffee, assistant general manager of the Cole Motor Car Co., of Indianapolis, has announced the appointment of Wm. B. Moyle as general manager of Cole Motors, Inc., of California.

W. H. Metcalf was elected president his fourth consecutive term, of the Automobile Accessories Business Assn. when that organization held its November meeting in Philadelphia. Other re-elections were: treasurer, N. A. Petry, and secretary, A. W. Stellwag. A new vice-president was chosen, C. Harry Walz, who succeeds George L. Fischer.

Rudolph Miller, who has been advertising manager of the National Motor Car and Vehicle Corp. of Indianapolis, has been made assistant sales manager.

William R. Petze has been appointed sales manager of the American Metal Parts Co. of Boston, which manufactures piston rings. Petze has a record of 17 years in the automotive industry, the greater part of which has been spent with automotive and hardware jobbers in this country and in Canada. Until recently he was sales manager for branches of the Splitdorf Electrical Co. of Newark.

Morgan Douglas, formerly manager of the Portland, Ore., Chevrolet retail branch, has been appointed assistant to the zone sales manager at the Chevrolet factory, Flint.

pany and also in Durant Motors Inc. There will be no severance of his relations with Durant, and it is understood that he soon will accept a high position in the parent Durant organization in New York. The Sheridan car was designed by Burke when Durant was president of General Motors.

SIGNAL TRUCK DROPS PRICES

Detroit, Dec. 3—M. B. Hoagland, representing the reorganized Signal Motor Truck Co., announces price reductions on the Signal line ranging from \$400 to \$900. The prices follow:

	Old Price	New Price
NF 1 ton.....	\$2475	\$1950
H 1½ ton.....	2925	2875
J 2½ ton.....	3275	2875
M 3½ ton.....	4275	3675
R 5 ton.....	5300	4400

It is stated that the new company will make no change in the construction of the trucks. Incorporation papers will be filed at Lansing in a few days, after which officers and directors will be elected.

ROAMER CLIPS PRICES

Boston, Dec. 6—The Roamer Motors Corp. has announced a reduction in price on its models as follows:

	Old	New
Roadster	\$2000	\$1975
5-pass. touring	2000	1975
7-pass. touring	2100	2050
Coupe	2450	2400
Sedan	2750	2700

STANDARD TRUCK PRICES DROP

Detroit, Dec. 6—The Standard Motor Truck Co. has reduced the price on its entire line.

	Old Price	New Price
Model 1-K 1½-ton.....	\$1800	\$1600
Model 76 2½-ton.....	2800	2400
Model 66 3½-ton.....	3600	3200
Model 5-K 5-ton.....	5250	4500

Hupp, Maxwell, Ford Meeting Steady Demand for Cars

Production Is Being Slowly Expanded on Increasing Orders; American Gear Opens

DETROIT, Dec. 5—Shipments of the Ford Motor Co. for November will approximate 75,000, for which the schedule called at the beginning of the month. Business in December is expected to reach about the same proportions. There is a steady demand from practically all branches, but manufacturing at the Highland Park plant will be on a somewhat smaller scale than in recent months, although it is declared there will be no shutdown before the inventory period, which begins Dec. 25.

Production of the new Maxwell chassis has been increased steadily to fill the orders which are coming to the factory from all parts of the country. Output is being expanded slowly so that the high mechanical order will not suffer. Production of the new car has been averaging higher than 100 cars a day.

The plant of the Hupp Motor Car Corp. is running on a basis of 50 a day. The company built 1300 cars in November. A steady business is looked for in December and the factory will not close for inventory, as this was taken late in the summer. The American Gear Mfg. Co., a subsidiary of Hupp at Jackson, Mich., has resumed work with 350 men after a six weeks' shutdown.

YUBA RAISES PRICES

San Francisco, Dec. 2—A revision upward in prices of the Yuba Ball Tread Products is announced by the Yuba Products Co.

	Old Price	New Price
12-20	\$2470	\$2600
15-25	2945	3100
20-35	3975	4185
25-40	4417	4650
Rodebilder	4755	5000

All prices are f.o.b. Benicia, Calif.

MACCAR TRUCK REDUCES

Scranton, Pa., Dec. 1—Price reductions have been made in several models of trucks manufactured by the Maccar Truck Co. The list follows:

	Old Price	New Price
Model L 1½-ton.....	\$2925	\$2700
Model H-A 2-ton.....	3100	3100
Model H-2 3-ton.....	3650	3400
Model M 4-ton.....	4500	4200
Model G 5 and 6-ton.....	5500	4950

DIXIE FLYER DROPS PRICE

Louisville, Dec. 5—Kentucky Wagon Mfg. Co. has made downward revision in its prices on the Dixie Flyer, as follows:

	Old	New
Touring car	\$1345	\$1195
Roadster	1345	1195
Speedster	1545	1395
Sport touring	1545	1395
Sedan	1995	1895
Coupe	1995	1895

The READERS' CLEARING HOUSE

Questions & Answers on Dealers' Problems

Planning the Filling Station

NO. 367

Q—Enclosed please find rough sketch giving the lengths and width of a triangle lot on which we wish to erect a modern filling station. You will note that the Lee street level is two feet above Commonwealth avenue, and there is a five foot concrete sidewalk to cross over. Will you kindly assist us in planning this filling station.—Triangle Garage, Roanoke, Virginia.

Space here is so limited that a good layout for two pumps seems impossible, and even for one pump is not ideal.

In building a filling station of this kind, it is well to have room for several cars, the more the merrier, so that several can drive in and get out of the way of street traffic while waiting their turn at the pump.

As laid out, this space would only accommodate four cars without obstructing the sidewalk. With one pump, it would accommodate three cars, so we believe the one pump scheme would be the best investment. It would also be better, allowing a large office building with room for toilets, etc.

The two feet drop in level between the two streets should give you no trouble, though it might be well to make the grade slightly sharper at the two ends with a more level space between.

Holding Car for Bill Under Lien Law

Q—The party in question had work done on his car Sept. 14, 1920, and other small work after these dates. He made a payment on June 7, 1921. He then had more work done on it on Sept. 18, 1921.

Now, can I hold his car for the full amount dating from Sept. 14, 1920, to date under the lien law? Will you publish a statute of the new lien law just published and passed? Please rush this through.—A. D. Stuehm, Peotone, Ill.

You cannot hold the car in question for the amounts due on repairs, etc., which were contracted before the new Garagekeeper's Lien Law; and you may not hold a car under this statute of Illinois for work done 60 days prior to the delivery of the car to the owner, unless within the 60-day period you have complied with the requirement of the act as to the filing of your notice of lien in the office of the county recorder.

There are now two liens open to the garagemen in Illinois. One is the common law lien, and this requires the repairman to retain possession of the repaired article until his claim is settled. The other lien is the statutory one mentioned. Under this lien one may deliver possession of the car or other repaired article to the owner, or his duly authorized agent, and still retain the lien. But this lien will close at the expiration of

The Readers' Clearing House

THIS department is conducted to assist dealers and service station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; General Business questions by MOTOR AGE organization in conference.

60 days from date of delivery unless within the 60-day period he has filed in the county recorder's office, in the county where the labor, skill and materials were expended on such car or other chattel, a lien notice, setting out the name of the claimant, the name of the owner, a description of the article sufficient for identification, upon which the claimant has expended labor, skill and material,

or has furnished storage, with dates and the amount claimed. These facts are sworn to.

You should be able to get printed forms for this purpose from your recorder or clerk of the court.

You should file your claim for lien at once on the work done on Sept. 18, 1921, so as to come within the 60-day period.

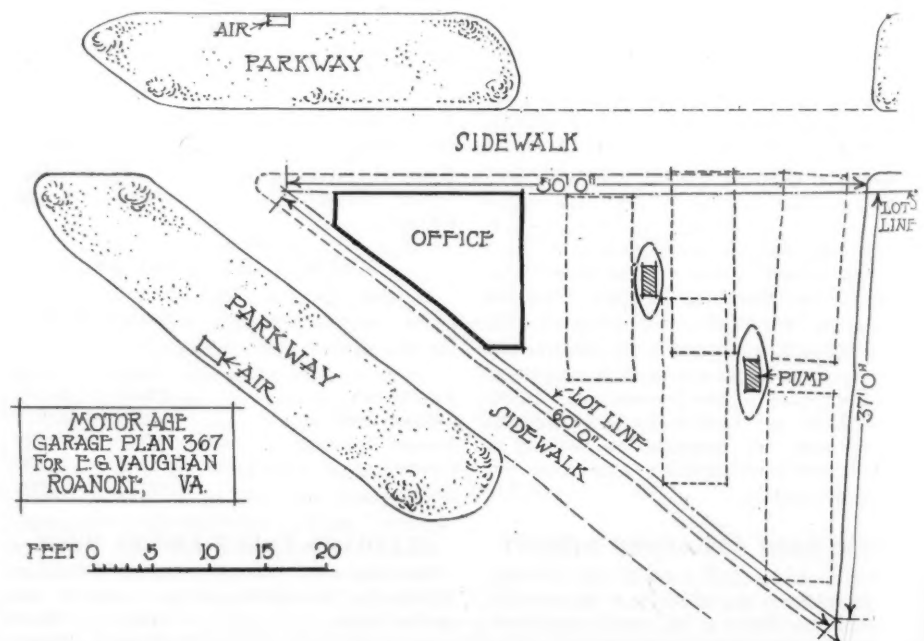
GEAR RATIOS OF VARIOUS CARS

Q—Give the gear ratios for the following: 1922 Hudson sedan, 1922 Cadillac sedan, 1922 Cadillac Suburban, 1922 Stutz Bearcat, 1922 Pierce-Arrow sedan, 1922 Locomobile sedan.

2—What is the best type for a large engine, a T veed or valve-in-head? Give lasting qualities.—Athur Nelson, Cherokee, Ia.

1—The gear ratios of the 1922 models of cars are not available as yet. However, in nearly every case the gear ratios given below are the gear ratios that will be used on next year's cars. We have secured the gear ratio data from the various service stations in the city: 1922 Hudson sedan, 4 9/11 to 1; Cadillac enclosed car, all enclosed models, 5 to 1; Stutz two-passenger models, 3 to 1, four and six-passenger models, 4 to 1; 1922 Pierce-Arrow, 4.286 to 1; 1922 Locomobile, all models, 3.85 to 1.

2—This is a question which cannot be answered with any definiteness. There are engines of both types that have given service over a great number of years and are still running. Of late, the valve-in-head has shown gain among makers of high-grade cars.



Plan 362—The shape and size of this lot makes it difficult to obtain an efficient arrangement for a filling station. One pump is recommended as best suited for this lot

VALVES OVERLAP ON FORD RACING ENGINE

Q—Give your opinion on overlap for head valve motors and state how much you think could be used to an advantage. In my few years' racing experience I have found that I can develop more speed with several degrees overlap than without any at all. Of course, I know you cannot use any overlap to an advantage on just an eight-valve Ford motor or a T-head motor or L motor. I notice in your Motor Age of recent date where you advised increasing the weight of the Ford flywheel for racing. I think this is wrong and would like you to explain why you think it should be heavier.

2—Send me the address of the Philbrin Ignition Co.—A. W. Fields, San Angelo, Tex.

1—Valve overlap is beneficial only in high velocity engines. The amount of overlap can be determined only by experiment, there being no laws governing it.

2—The Philbrin Corp., Kennett Square, Pa.

ADJUSTING MODEL A JOHNSON CARBURETER

Q—Explain function, also theory of adjustment of the small needle pin adjusting device on the side of a Johnson model A carbureter used on an Oldsmobile eight-cylinder model 45 of 1917.—J. H. Keyser, Elko, Nev.

The Oldsmobile model 45 eight was equipped with both a model A and a model B Johnson carbureter. The adjustments on both of these carbureters are the same, but the idling adjustment on the model A is of the type where the adjustment is secured by regulating the gas admitted to the carbureter, whereas in the model B the idling adjustment is an air adjustment.

To adjust the model A carbureter, proceed as follows: turn both the idle screw and the high speed needle to their seats and set the throttle lever stop screw to approximately the correct position for closed throttle. Next open the high speed jet on the bottom of the carbureter one and one-half turns; with the adjustment in this position the engine can be started.

Second, after the engine has warmed up to the normal driving temperature, place spark lever in fully retarded position, and advance the throttle lever until the engine is running about 1000 r.p.m., or about 20 to 25 m.p.h. car speed. Turn high speed needle to right until the engine speed increases, which adjustment secures as lean a mixture as the engine can be run on. Then reverse conditions by turning high speed needle to left until engine speed decreases and again starts slowing up, which adjustment secures as rich a mixture as can be run. By turning again to the right to a point halfway between the two, or to the highest engine speed, it gives the correct mixture for all throttling and open throttle running.

Third, adjust the throttle stop screw until the desired idling speed is secured, or about 240 r.p.m. If the engine does not fire evenly with the spark and throttle fully retarded, correct it by either backing out the idle screw which gives a rich mixture, or by turning in its seat right for lean mixture. The idle screw should be about one-half turned

out. The idle adjustment must be made with the spark lever in fully retarded position.

Fourth, the float should set evenly all around; the bottom of the float should be $\frac{1}{8}$ in. from the float chamber seat. This dimension is set accurately at the factory and should not be changed. High and low speed adjustments are entirely independent and one is not affected by the other. The action of your carbureter denotes a rich mixture. We would suggest that you use as thin a mixture as possible for altitude work, as altitude decreases the amount of air that is drawn into the carbureter air opening, and if

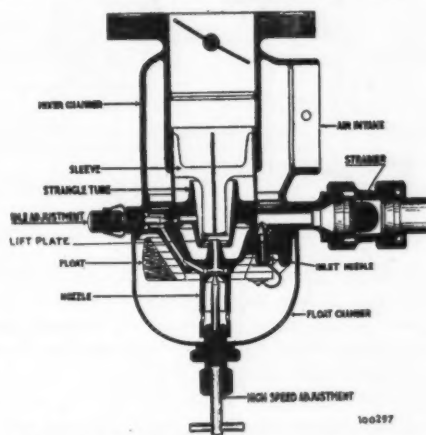


Fig. 1—Model A Johnson carbureter used on the 1917 Oldsmobile 45

the gasoline adjustment remains constant, a rich mixture will ensue. The carbureter is shown in Fig. 1.

OIL IN COOLING WATER

Q—On an Overland, model 20 light four, the oil gets in the radiator. Draining the water every 200 miles shows a pint of oil. The water never seems to get in the crankcase.

2—Show adjustment of model 34-B, 1919 Oakland carbureter.—Reader, Greenville, Iowa.

1—This denotes either a leaky cylinder head gasket or a porous cylinder well, allowing oil to go from the cylinder into the cooling system.

2—The Marvel carbureter used on this model is shown in Fig. 2. To adjust, proceed as follows:

Start the engine and set the throttle for the engine to run at moderate speed—which means nearly closed. Turn the needle valve a trifle at a time until the engine runs smoothly, allowing it to run

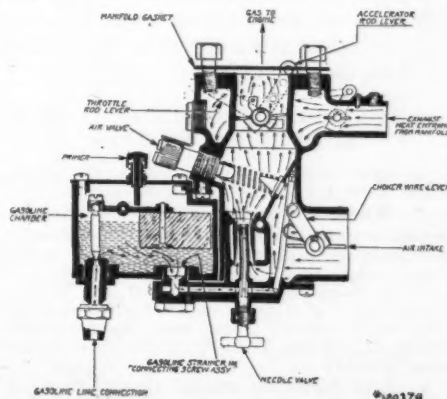


Fig. 2—Sectional view of Marvel carbureter

until thoroughly warmed up before making final adjustment.

To get final adjustment, turn the air valve screw to the left, releasing the air valve spring, until the engine begins to slow down. This indicates that the air valve spring is a trifle too loose; turn the air valve screw to the right about one-eighth turn at a time until the engine runs smoothly. Advance the spark lever on the top of the steering gear about one-half of its entire travel. Open the throttle quickly and as far as possible. Upon doing this, the engine should speed up promptly and quickly. If the engine hesitates or a popping noise in the carbureter is heard, turn the needle valve a trifle to the left, to admit more gasoline, and again open the throttle.

Continue this adjustment until the carbureter stops popping, when the engine should run smoothly at all speeds. The air valve screw should be so adjusted that the end of the screw is about even with the ratchet on spring. The needle valve should be adjusted so that is five-eighths to seven-eighths of a turn open.

ENGINE DATA

Q—Publish torque, horsepower, curves and weights of Packard "single six," Duesenberg "straight 8" and Wills Ste. Claire cars.

2—Can any 1920 back numbers of Motor Age be secured?

3—What date was the description of the Packard "single six" given?—Louis Ellington, Chicago, Ill.

1—This information is not available at the present time.

2—This question will be answered by special letter.

3—Sept. 30, 1921, issue of Motor Age, page 16.

MYSTERY TALES

AN INTEMPERATE DODGE ENGINE

Mystery Tale No. 109

After a Dodge car had been driven a few hundred miles it was noticed that the oil consumption was excessive—about 70 miles to a quart. Many different makes and grades of oil were tried, with somewhat varying, though all were poor results. Ultimately new rings were fitted and oil pumping was reduced to about 150 miles per quart of oil used. However, at the completion of about 1,000 miles running on these new rings, oil was again pumping and consumption was about 60 miles to a quart. New pistons and new rings also were fitted with like results, as when new rings only had been used. Many valves and a few new spark plugs were also used as a direct result of the oil pumping.

The actions of the above engine are to be severely criticised during these days when economy and frugality must be practiced. An unreasonable appetite for oil, such as this engine displays, should be a cause of genuine worry to all concerned in the mechanical departments of our garages. This case provides an interesting study in trouble shooting. We have the answer, as supplied by the reader, in our office, but intend to withhold it for a while.

WANTS TO CONVERT 12-VOLT SYSTEM INTO SIX-VOLT

Q—Advise how to change the double six-volt battery on a 1917 Maxwell and use a single six-volt battery without damaging anything. Wish to use this six-volt battery for cranking and for lights.

2—How will the generator have to be wired?

3—Publish wiring diagram of Maxwell.

—H. W. Davison, Union Garage, Jacksonville, Tex.

1—This change cannot be made unless the starter is rewound for six volts. The six-volt battery will not have sufficient voltage to operate the starter in its present condition. The only possible way in which you can utilize a six-volt battery is to have the starter rewound for six volts by the Simms-Huff Co.

2—No change in the wiring of the generator will be necessary.

3—The starting circuit is shown in Fig. 4.

REMOVING HEAVY RUST FROM ARMATURES

Q—We have quite a few magneto and generator armatures which are to be rewound, but they have become very rusty and we would like to know some formula for removing the heavy rust before we rewind them.—Allen Auto Electric Service, San Antonio, Tex.

The following extracts from the Scientific Cyclopedia of Formulae give directions for rust removal which, while we have not had opportunity to try them, we believe will prove efficacious:

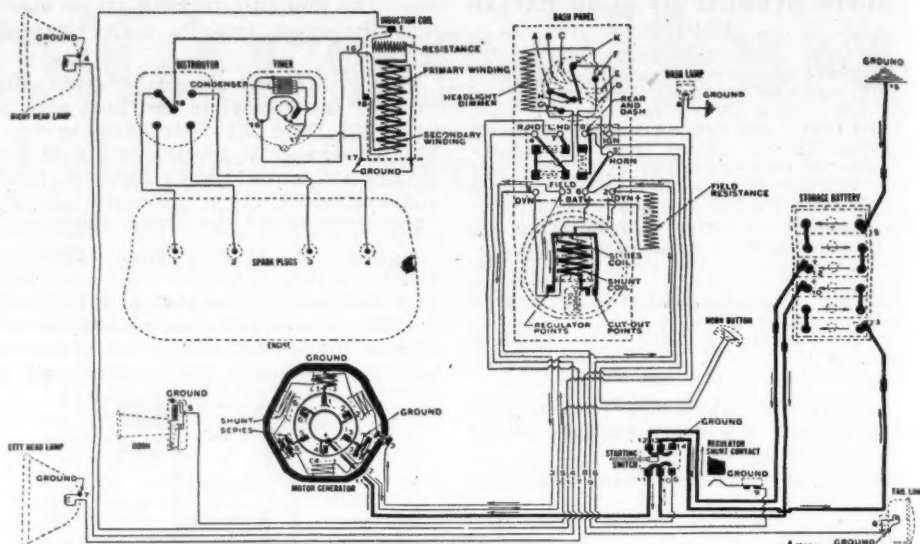
"A simple and effective way of cleaning rusted iron articles, no matter how badly they are rusted, consists in attaching a piece of ordinary zinc to the articles, and then letting them lie in water to which a little sulphuric acid is added. They should be left immersed for several days, or a week, until the rust has entirely disappeared, the time depending upon how deeply they are rusted. If there is much rust, a little sulphuric acid should be added occasionally.

"The essential part of the process is that the zinc must be in good electrical contact with the iron. A good way is to twist an iron wire tightly around the object, and connect this with the zinc. Beside the simplicity of this process, it has the great advantage that the iron itself is not attacked in the least, so long as the zinc is in good electrical contact with it.

"'Domestic Engineering' says that when there is only a little rust, a galvanized iron wire wrapped around the object will take the place of the zinc, provided the acid is not too strong. The articles will come out a dark gray or black color, and should then be washed thoroughly and oiled. The method is specially applicable to objects with sharp corners or edges. The rusted iron and zinc make a short-circuited battery, the action of which reduces the rust back to iron, this action continuing as long as any rust remains.

"Iron articles thickly coated with rust may be cleaned by allowing them to lie in a nearly saturated solution of chloride of zinc from 12 to 14 hours."

The same authority gives the following instructions for cleaning and recutting old files. They will apply, with modifica-



WIRING DIAGRAM OF 1917 MAXWELL

Fig. 4—Maxwell starting circuit

tion, to cleaning the rust from armatures.

"Boil the files in strong soda and water to clean off all grease, oil or gum; then dip for a few minutes in a bath of one part nitric acid, four parts water; the length of time would be less on fine files, as your experience may suggest. To resharpen old files, wash the files in warm potash water to remove grease and dirt, then wash in warm water and dry by heat. Put one and one-half pints of warm water in a wooden vessel, put in the files, and three ounces of blue vitriol, finely powdered, and three ounces of borax. Mix well and turn the files so that every one may come in contact with the mixture. Add 10½ ounces of sulphuric acid and one-half ounce of cider vinegar. Remove the files after a short time, dry, rub with olive oil, and wrap in porous paper."

The foregoing will apply to the armatures very nicely. Where the word files is used substitute armatures. It should be understood that the processes apply to the iron only and that the commutator must not be allowed to come in contact with the solution. A very good way to protect them will be to dip them in melted paraffin before immersing the armatures in the solution. However, even though they may be fully protected by the paraffin, nothing is to be gained by immersing them in the solution, and it should not be necessary, as there will be plenty of clearance between them and the iron of the armature core to allow for the submerging of the latter without wetting the commutators.

COMPARISON OF STATIONARY AND AUTOMOBILE ENGINES

Q—How will an automobile engine compare with a stationary engine for power?

2—What is your opinion in regard to using second-hand four and six-cylinder automobile engines for stationary work such as pulling electric generators?

3—A Ford engine is rated at 22 hp. How near would it come to developing this same power as a stationary engine rated at 22 hp., if they were both properly belted?

4—How large an engine should be used to operate a 15 kw. 220-volt three-wire generator at a speed of 1325 r.p.m.?

5—Would this size generator overload

a Herschell-Spillman 1915 six-cylinder engine, 48 hp., at 1500 r.p.m.?

6—In factory horsepower ratings for stationary and automobile engines, are the same formulae used to determine their horsepower?—Frank Swanson, Claremont, S. D.

1—If judged from a standpoint of power without regard to crankshaft speed, the stationary engine will show more than double the power of the automobile engine at low crankshaft speed. The stationary engine is designed and built to give the maximum of power at the lower speed ranges and, usually being governed, the advantages of full load conditions are utilized. A stationary engine is a slow speed heavy duty type of engine.

2—This can be done if the engine is not overloaded and is allowed to run at its most efficient speed. A system of speed reduction wherein the crankshaft bearings are relieved of all radial load is necessary if good service is to be expected. A speed approximately 300 to 400 r.p.m. lower than the maximum speed should be maintained as the operating speed.

3—The actual brake horsepower of the Ford engine is 19 at 1500 r.p.m. It would develop exactly the same horsepower as a 19 hp. stationary engine, if properly belted, less the friction losses of the belt, pulley, shafting, etc.

4—An engine of 20 to 25 hp.

5—Not if properly installed.

6—In most cases the horsepower is determined by the use of an electric or hydraulic absorption dynamometer. This device determines the horsepower of any engine absolutely and is used almost universally.

DATA ON PACKARD EIGHTEEN

Q—Publish wiring diagram of Packard car No. 26L08, about a 1910 or 1909 model.

2—Publish illustration showing adjustment of rear axle and transmission.—A. R. Morse, Cottonwood, S. D.

1—Packard car was produced between 1911 and 1912 and known as model 18. The wiring diagram is shown in Fig. 5.

2—The illustration does not clearly show the adjustment features of the axle. However, the adjustment of the rear gear

is secured in the same manner as in present day axles, through the medium of a threaded housing in which is mounted the combination radial and thrust bearing. Means are provided to lock these adjustments on each side of the ring gear and at the pinion shaft by the use of lock screws.

STUDEBAKER ENGINE PRESENTS OIL PUMPING PROBLEM

Q—We have a Studebaker 1921 light six in this city, and from the very start it has been pumping oil. It has had no power, and the local service station has failed to remedy matters such as the lack of power and the fouling of the plugs. Finally Mobiloil B was substituted for the original lubricant and the car worked fine for a while, but it soon was the same old story. So the owner went to another place and they put in new piston rings, which they claimed would stop the trouble, but they might as well have left them out, as the car is just as bad as ever. Advise us what the trouble may be and how it can be remedied.—Swan Kjellander & Son, Gladstone, Mich.

Oil pumping troubles are becoming more prevalent as the qualities of the fuels change for the worse. We question that the pistons and rings of the engine were or are at fault at all. We are led to assume this stand by the fact that when the lubricant was changed, the engine behaved perfectly for some time. The consequent failure, we believe, was due to the fresh lubricant becoming diluted by the unburned portions of the fuel which leaked past the pistons. It is strange that it has occurred to nobody in your city to drain the oil out again and replace it with fresh.

Another thought that occurred to us is that the owner has been too conscientious in keeping the cylinder oil up to the full level recommended by the manufacturer. Assuming that the replacement rings were correctly fitted, we believe that the performance of this engine can be greatly bettered by carrying the oil at a lower level and changing it every 500, or at the most every 1000 miles. We know of engines which are running perfectly with the oil level maintained much below that recommended. If the oil was brought up to the proper level, these engines would at once begin

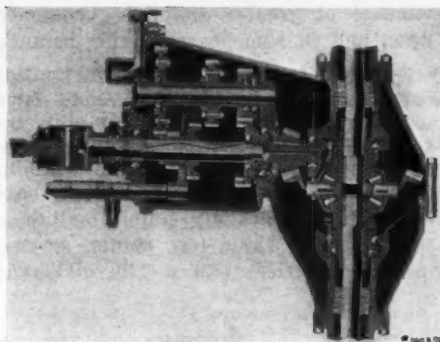


Fig. 6—Sectional view of Packard model 18 rear axle

to smoke, foul plugs and give all the other distressing symptoms of oil pumping.

Other readers will do well to keep the foregoing suggestions in mind and when called upon to remedy oil pumping, first drain out all the old lubricant and replace it with fresh, stopping short of the quantity formerly used.

INSTALLING AMMETER ON MODEL K HUPMOBILE

Q—Supply information on how to wire an ammeter on a model K, 1915 Hupmobile. Publish wiring diagram.—Andrew Morgan, Garage & Repair Shop, Ravenna, Neb.

The wiring diagram is shown in Fig. 7. An ammeter can be installed, as shown in the diagram, but it must be of the universal type such as the Roller-Smith universal model PV. This is a high capacity meter and will not be injured by the starter discharge.

FORD RACING CAMSHAFT

Q—Give engine specifications of one of the fastest Ford racers in America, especially the camshaft and the valve timing.

2—How can a Ford engine be timed so that the intake valve opens 10 deg. after top dead center and closes 50 deg. after bottom dead center; exhaust valve opens 50 deg. before bottom dead center, and closes 20 deg. after top dead center?

3—How can I make at a small cost a Ford camshaft to give a valve of $\frac{1}{2}$ in. to the Fordson tractor valves installed in a Ford engine? Is this advisable?—J. B. Fronkier, Fredonia, Kan.

1—The following is a description of a Ford rebuilt engine which developed 52 hp. Pistons are of aluminum alloy fitted with two rings each. The rods are made from stock Ford forging. These are machined to remove all surplus weight, and the bearings have been fitted to take special oil disks to supply additional lubrication. The oil pump was installed on the side of the engine operated from No. 4 intake cam, from which leads are run to each main bearing so that at all times oil is being fed at pressure to the main bearing. The oil level is higher than that of the stock Ford.

The engine is equipped with a racing 16-valve head. A centrifugal water pump is driven by bevel gears from the vertical shaft which drives the camshaft. The ignition is obtained from the regular Eisemann speed Ford outfit and, as the cylinder head is equipped with two sets of spark plugs, double ignition was secured by the use of series spark plugs. The 16 valves are each $1\frac{1}{4}$ in. in diameter. Data concerning the camshaft setting and valve timing angles is not available.

2—To obtain a camshaft having the timing characteristic that you describe would entail one of two methods—either to have it made in a local machine shop or in your own laboratory or to have the camshaft constructed by some of the leading camshaft manufacturers. If the camshaft is to be made at home, it will necessitate laying out the cams individually and keying and pinning them to a shaft, after which operation the cams are ground to final finish. Both of these methods are expensive, and we would suggest that you communicate with some of the firms now making special Ford racing camshafts.

The names and addresses of the manufacturers of these shafts were sent you by letter. The same information may be obtained by referring to the advertising columns of MOTOR AGE.

3—This operation cannot be done successfully without a great amount of expense, as outlined in answer one.

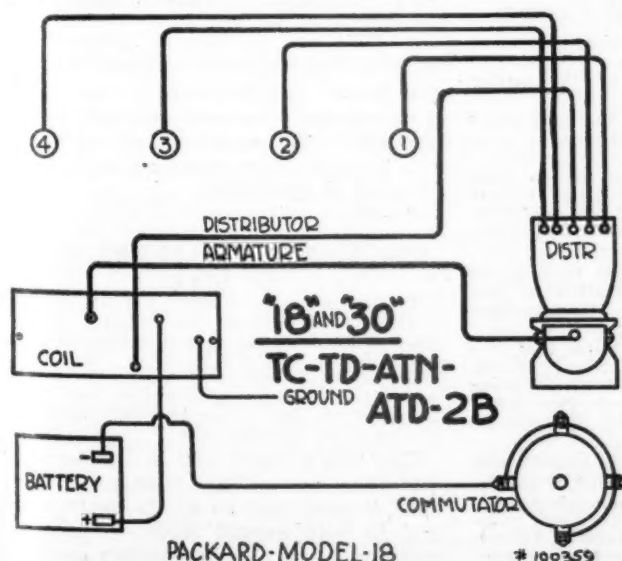


Fig. 5—Wiring diagram of Packard model 18

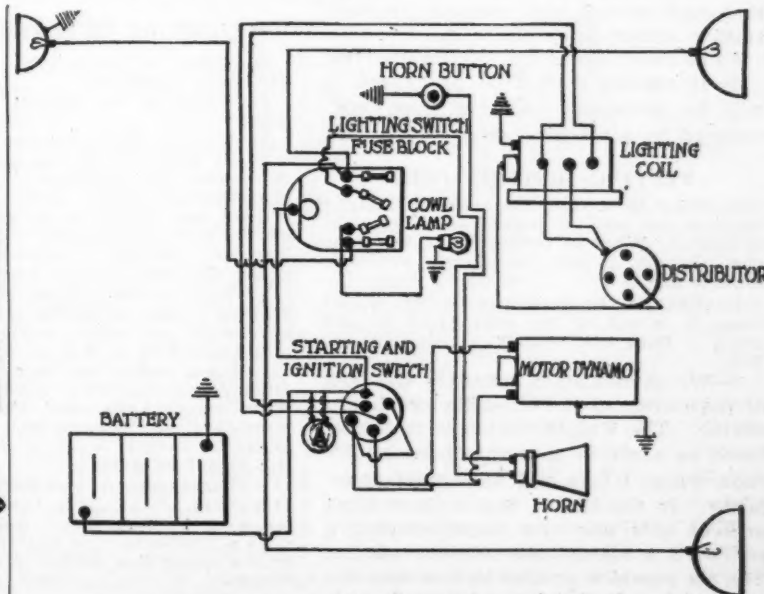


Fig. 7—Wiring diagram, model 16 Hupmobile, showing ammeter installation

FIGURING CYLINDER VOLUME

Q—Supply formula used for figuring piston displacement of engines.

2—Is there any book or publication devoted entirely to racing, racing engines or racing information?—Bridgeport Motor Co., Inc., Bridgeport, Neb.

1—To find the volume of a cylinder; area of the base times altitude. As an example, a bore of a Ford engine is $3\frac{3}{4}$ in., the area of the bore will equal the diameter square times the constant .7854, which is approximately 41 in. per cylinder, multiplied by four cylinders, giving a cubic displacement of approximately 164 in. Put in its simplest form, the formula is as follows: first find area of bore; area equals diameter square times .7854; volume equals area of base by altitude.

2—We know of no such book.

MAXWELL MASCOTTE DATA

Q—Advise year model of Maxwell Mascotte roadster No. 1A80210.

2—Am having trouble with the clutch slipping. What is the make of the clutch?

3—Can a cut of same be printed showing adjustments?

4—If necessary to purchase repairs, where can these be purchased?

5—If repairs cannot be purchased, what remedy would you suggest?—Oran G. Edwards, Cable, O.

1—1912.

2—This clutch was manufactured by the Maxwell-Briscoe Corp.

3—There is no cut available of this clutch. It is of the multiple disk type and the plates are of steel. It is designed to run in oil, and the application of coal oil tends to remove this oil. The slipping may be due to insufficient spring pressure, and this spring pressure may be made greater by turning the adjusting collar to the right. This collar is located just behind the spring. We would advise that the bearing and washers be carefully tested, to determine whether the thrust bearing causes the slipping; discontinue the application of oil and tighten the ring. If neither of these remedies cures the slipping, the clutch must be taken apart and the bearings and other parts examined and replaced. This should be done by an experienced man, and MOTOR AGE suggests that you permit the nearest Maxwell service station to do the work.

4—Maxwell Motor Co., Newcastle, Ind.

5—If repairs cannot be purchased, it will be necessary to have them constructed by a machine shop.

TESTING IGNITION COIL

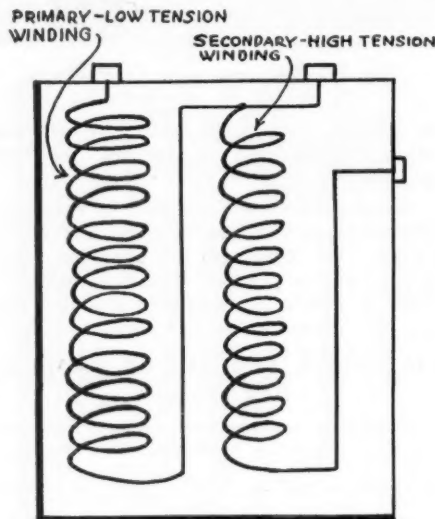
Q—Why is it that six-cylinder Knight engines are not as popular as the four-cylinder? What advantage has the four over the six, if any, or the six over the four, if any?

2—What is the best way to test a coil when it is out of the engine? I do not mean a Ford coil.—R. H. Young, Sparta, Wis.

1—We cannot state definitely the lack of popularity of the six-cylinder Knight engine. The Knight engine is manufactured as a six in great numbers in Europe, where it has met with great popularity. In the United States there is at present only one firm manufacturing a car with a six-cylinder Knight engine. The six provides greater torque than the four, although the four claims the ad-

vantage of greater simplicity, compactness, and in some cases better balance.

2—The internal diagram of an ignition coil is shown in Fig. 8. Aside from testing the coil in connection with the rest of the system by snapping the breaker points open and closed with the fingers and noting the quality of spark at the plugs, the only simple method is that of using three test points, arranging these series with a 110-volt lamp,



DELCO COIL

Fig. 8—Internal diagram of an ignition coil

using current from the commercial lighting circuit. This latter method will determine whether either the primary or secondary windings are open, but will not indicate whether they are short-circuited.

A very good method of checking the coil output is known as the bridge test. In this test the suspected coil is compared with the one that is known to be normal. A low reading voltmeter is used in this test. An explanation of the bridge test, together with a simple diagram of the necessary apparatus, is in the July 14 issue of MOTOR AGE.

WEIGHT OF CHALMERS CHASSIS

Q—What is the weight of the chassis, Chalmers model 24?

2—What is the weight of the power plant?

3—What is the weight of the rear axle?

4—At what revolution per minute does it develop its maximum horsepower?

5—During warm weather or on long trips I get about 10 or 11 miles to the gallon with the original old Rayfield carburetor. Would a new carburetor improve the performance materially?

6—What is the highest gear ratio up to 2.50 to 1 that could be installed in this rear axle, and where could I obtain special gears 2.50 or 2.75 to 1?

7—I am under the impression that the Master Six Chalmers used No. 5 Houck wire wheel hubs, and that these hubs would fit on this model. Is this true? Will the model 26 or model 29 hubs fit the model 24 axles?

8—The engine in this car is smooth and free from vibration up to about 58 m.p.h., when it becomes very noisy, though it does not vibrate. Do the valves and camshafts cause this noise?—Glenn F. Crowe, Wooster, O.

1—3370 lbs.

2—This is not available, but we should approximate its weight as 900 lbs.

3—This is not available.

4—Approximately 64 hp. at 1600 r.p.m.

5—A more modern carburetor probably would give slightly better results, especially in cold weather.

6—The highest gear ratio would be approximately 3 to 1. The names of firms supplying special gears will be supplied you by letter.

7—Models 24, 26, 29 and the Master Six all use No. 5 Houck hubs.

8—Yes.

THIRD BRUSH POSITION

Q—Is there any way to find out the correct position or the neutral plane of the main brush holder of a Ford generator, if this has been moved without putting the generator on the test stand and running it as a generator?

2—Explain why, when moving the third brush for increasing or decreasing the charging rate on a generator, that the curvature of the brush in regard to the commutator is changed. It has always been said that when the third brush is moved, it should be sanded in.

3—In the case of a generator that changes its polarity when the battery is put in backwards, the question arises at what time does the generator reverse its field so as to conform to the polarity of the battery. Is it when the generator first cuts in or when the speed of the generator decreases so that the cutout points open? Does the discharge back from the generator through the cutout points cause the cutout points to open, reversing the generator field?—Warren L. Deppeler, Portland, Ore.

1—No.

2—Curvature of the brush in regard to the commutator should not be changed if the slot in which the brush holder is mounted is truly parallel in the circular path with the commutator. Because of variation in workmanship, the recommended practice is to resand the brush when the third brush is moved in the slot.

3—When the generator first cuts in.

REGULATING BATTERY CHARGE

Q—Can a switch be placed in the battery charging circuit of a Buick, model K 45, so that the battery could be charged or not, at will? I intended to eliminate burning the lights on long stretches of continuous driving during the day.

2—Does the third brush make such an idea impossible?—Edgar Gifford, Chicago, Ill.

1—This can be done by connecting a wire to the generator terminal ahead of the cutout; run this wire to one side of a switch, the other side of which can be grounded. The regulation of the charge can be secured by placing a carbon pile rheostat in the circuit.

2—No.

GROUNDING HIGH TENSION LEADS OF DIXIE

Q—We wish to install a four-cylinder Dixie magneto on a two-cylinder engine, grounding the two opposite high tension leads which will not be used. Tell me if this would injure the magnets in any way; if so, could a gap about $3/16$ in. be inserted in the ground wire?—John M. Thomas, St. Joseph, Mo.

The safety spark gap in the magneto will take care of this discharge. However, it would not do any harm to put a gap in both ground leads; one of the common spark plug intensifiers could be used for this.

INTERESTED IN MAKING AN ARMATURE GROWLER

Q—Show by diagram and dimensions the size of the parts and the amount of wire needed to make an armature growler like the cut in Fig. 2 in the October 13 issue of Motor Age. The diagram of a growler shown in the July 21 issue did not give dimensions. Give all of them.

2—Have the Kant Skore pistons been in service long enough to be an assured success? We would like to put in a set of them in a 1919 Velie, 7W Continental engine.

3—Would planing off the cylinder head $\frac{1}{8}$ in. give the engine much more power? Will the cylinder head stand such a heavy cut? The engine has an average compression of about 60 lbs. at cranking speed when cold. We have Motor Age back files since March 25, 1920.—Geo. Hendry, Portland, Ore.

1—The growler illustrated is a patented device and the dimensions are not available. Neither have we all of the dimensions of the growler illustrated in the July 21 issue. However, you will be safe in making the core 3 in. long and 2 in. square. This part, as well as the uprights, should be made of soft laminated sheet iron or magnetic steel. Working from the dimensions of 3 by 2 by 2 in., the other parts are quite easy to calculate. From $3\frac{1}{2}$ to 4 pounds (preferably the latter figure), 2100 ft. of double cotton covered No. 22 B. & S. gage wire will be required. Each layer should be heavily shellaced as it is applied. As we have mentioned several times before, we recommend that these apparatus be purchased from their manufacturer, as the time consumed in making them will be worth more than their cost.

2—The Kant Skore pistons have a splendid service record and we have no hesitation in recommending them for the installation contemplated.

3—Planing off the cylinder head will, of course, result in a higher compression and a consequent greater engine speed and power. We are not prepared to say whether there is sufficient stock to allow for the $\frac{1}{8}$ in. cut. We recommend that a 1-16 in. cut be tried first. On the whole, we consider the present compression of 60 lbs. normal and suggest that you give the matter much careful consideration before embarking upon the experiment of increasing it.

ARMATURE TESTING GROWLERS IN DEMAND

Q—Give dimensions of iron core for armature growlers; also construction of same.

2—Give the number of turns of cooper-wire, size and number of taps to be brought out to vary the secondary voltage. We wish to use the growler to test both the starter and generator armatures. It is to operate on 110 volt 60 cycle A. C.

3—Is there an A. C. voltmeter made with a double scale and where can we procure it?

4—Where can we obtain a 12-volt starter for a 50 hp. Marine engine? This starter is to be fastened on the end of a short shaft through a universal joint. We have a starter of this description on a launch here, manufactured by the Hartford Suspension Co., of Jersey City, but this firm must be out of existence, as we have received no reply after having written to them some time ago.

5—Who manufactures a small generator that can be attached to a Ford engine to drive off the fan belt? This generator is

to give about 5 amp. at 6 volts.—Canadian Auto & Electrical Supply Co., Nelson, B. C. Canada.

1—Refer to the reply to Mr. Hendry.

2—We cannot tell you how many turns to make between taps to get the various voltages. A much simpler and quite satisfactory plan is to wind the growler for one voltage and to get the variation by inserting blocks of iron between the pole pieces when it is desired to test armatures with fine windings. This is known

as a magnetic shunt and has the effect of by-passing most of the magnetic flux before it can pass through the armature windings.

3, 4 and 5—A meter such as described can be procured from the Roller-Smith Co. The address of this concern as well as the addresses of the manufacturers of the apparatus inquired of in your questions Nos. 4 and 5 are being supplied by mail direct.

Data on French Grand Prix

Q—Tell me through your query department who won the 1914 French Grand Prix race. Make a chart showing the cars that started, how they finished, name of cars and drivers, speed and time. Also a similar chart for the 1913 race.

2—We have a Hudson, 1917 model, that uses a quart of oil every 25 miles driven. The car has been completely overhauled. The gage always shows five pounds, or the full capacity, although sometimes, when driving fast, the oil pump will stop working altogether and the gage goes back to zero; by then pushing out the clutch and jazzing the engine, it will start to work again. Tell me what is the trouble.—Ray M. Ramming, New Holstein, Wis.

2—You are using too much pressure on the oil. The stroke of the plunger should be set at 1 1-16 in. This is done by removing the oil pump plug at the end of the plunger barrel, inserting a small rod or pencil and measuring the movement of the eccentric. This movement should not exceed 5-64 in. If No. 6 cylinder carbonizes and fouls plugs, the oil trough should be enlarged by bending the metal away from the side of the case, allowing the oil to return to the pump faster. Examine the check valve and the plunger spring and increase slightly the spring tension on the check valve.

1—Order of finish in French Grand Prix, 1913:

No.	Car and Driver.	Country	Time	M.P.H.
14	Peugeot, Boillot	France	7:53:56	72.03
8	Peugeot, Goux	France	7:56:22	71.66
1	Sunbeam, Chassagne	England	8:06:20	70.19
2	Delage, Bablot	France	8:16:13	68.80
10	Delage, Guyot	France	8:17:58	68.55
9	Sunbeam, Resta	England	8:21:36	68.06
16	Schneider, Champoiseau	France	8:44:37	65.07
5	Excelsior, Christians	Belgium	8:57:23	63.05
20	Schneider, Thomas	France	9:04:00	62.75
6	Schneider, Croquet	France	9:12:56	61.74
11	Excelsior, Hornsted	Belgium	9:37:40	59.01

Also entered:

No.	Car and Driver.	Country
13	Itala, Nazzaro	Italy
7	Itala, Pope	Italy
17	Itala, Moriondo	Italy
4	Mathis, Esser	Germany
3	Opel, Joerns	Germany
19	Sunbeam, Guinness	England

Order of Finish in 1914 French Grand Prix:

Car and Driver.	Country	Time	M.P.H.
Lautenschlager, Mercedes	Germany	7:08:18	65.50
Wagner, Mercedes	Germany	7:09:54	65.20
Salzer, Mercedes	Germany	7:13:15	64.79
Goux, Peugeot	France	7:17:47	64.08
Resta, Sunbeam	England	7:29:17	62.07

Also entered:

Driver and Car	Country	Driver and Car	Country
Esser, Nagant	Germany	Pietro, Alda	Italy
Rigal, Peugeot	France	Cagno, Fiat	Italy
Duray, Delage	France	Guinness, Sunbeam	England
Champoiseau, Schneider	France	Gabriel, Schneider	France
Joerns, Opel	Germany	Scales, Fiat	Italy
Fagnano, Fiat	Italy	Tabeteau, Alda	Italy
Boillot, Peugeot	France	Cenisio, Nazzaro	Italy
Guyot, Delage	France	Juvanon, Schneider	France
Tournier, Picard-Pictet	France	Clarke, Picard-Pictet	France
Porporato, Nazzaro	Italy	Sailer, Mercedes	Germany
Elskamp, Nagant	Germany	DePalma, Vauxhall	England
Bablot, Delage	France	Pilette, Mercedes	Germany
Erndman, Opel	Germany	Nazzaro, Nazzaro	Italy
Chassagne, Sunbeam	England	Watson, Vauxhall	England
Breckheimer, Opel	Germany	Hancock, Vauxhall	England
Sisz, Alda	Italy	Constantini, Aquila	Italy

The Accessory Show Case

New Fitments for the Car

GWEN GASOLINE GAGE FOR FORDS AND CHEVROLETS

This gasoline gage will fit all models of the Ford and Chevrolet 490. In the Ford sedan the gage is mounted on the right-hand side of the driver's seat. The Ford coupe, with the tank under the rear deck, has the gage installed on the right-hand side of the body. The gage is finished in black enamel, baked on. The beveled rim is nickel plated brass. The tank fitting is held in the tank by two offset nuts, which come up under the filling flange and the same tank cap is used. Price \$3.75. Esse Products Co., 102 S. Brady St., Davenport, Ia.

JOHNSTON WINTER ENCLOSURES

The Johnston winter enclosure makes a smook finished job inside and out. The glass is cushioned on all sides, eliminating breakage. These tops are simple to install and make a permanent and attractive job. The construction consists of a patented, waterproof frame, furnished with either plain or beveled AA 3/16 in. crystal glass or plain or beveled 3/4 in. plate. William R. Johnston Mfg. Co., 451 E. Ohio St., Chicago.

WICKEY BATTERY

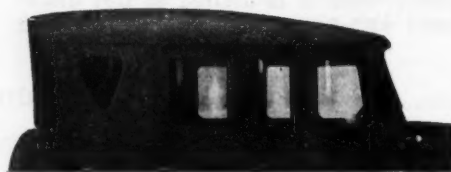
This is called a semi-dry battery. The acid and water electrolyte of the wet acid battery is displaced by a semi-solid mixture. No separators, as commonly known, are used. Instead are used three strip isolators, narrow strips of hard rubber, one at each end and one in the middle, fixed permanently between each plate. The electrolyte compound is semi-solid and the plates are always covered. Wickey Battery Co., East Chicago, Ind.

IDEAL PUSH BUTTONS

These push buttons are made of the best brass and rubbered composition. The top caps are nickel plated; bases and brackets are black enameled. The waterproof feature is effected by an ingenious double push button and cap. Price, 50 cents. Ideal Clamp Mfg. Co., 202 Bradford st., Brooklyn, N. Y.



Wickey battery



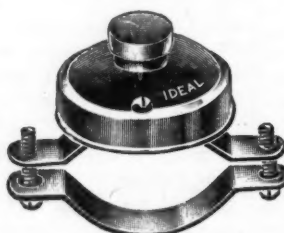
Johnston winter enclosures



Remind-O-Meter



Lyon convex bumper



Ideal push button



Gwen gasoline gage for Fords and Chevrolets

FRONT AND REAR LYON CONVEX BUMPERS

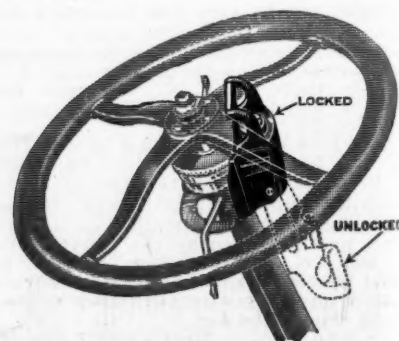
These bumpers are built of spring steel, heat treated and oil tempered throughout. The attaching arms are integral parts of the bumper and have absolute spring action under collision impact. The front bumper has an upwardly extending broadening bumping surface affording protection to lamps and radiator. It may be obtained with either three-way or two-way fittings, and weighs 39 lbs. The rear bumper is made with broad bumping surface extending downward instead of upward, completely shielding gasoline tank, with frame clamp fitting only. All bumpers are individually crated. Made in black with nickel clips, and nickel with black clips. Prices, \$17 to \$23. Metal Stamping Co., Long Island City.

STEERING WHEEL LOCK FOR FORDS

This device consists of a stationary and moving housing which is clamped on the outside of the steering post, the nuts of which are protected when the wheel is locked. When thrown in the up position, two arms swing between two spokes, so that the wheel cannot be turned in either direction, nor can the wheel be removed. It is constructed entirely of malleable steel. No drilling, tapping or machine work is necessary to install. Price \$7.50. New York Coil Co. of Pennsylvania, Inc., Mont Clare, Pa.

REMIND-O-METER

This is a device to keep record of the gasoline in the tank. Directions for use: first, fill the gas tank; second, note the last three figures registered by the speedometer and add them to the tank capacity in miles, indicating the result on the Remind-o-Meter; third, having done this, note the difference between the speedometer and the Remind-o-Meter as the car travels. This will indicate the approximate distance that can be covered before more fuel is needed. Price, \$1.00. The Remind-o-Meter Co., Detroit.



Steering wheel lock for Fords

Service Equipment

Time Savers for the Shop

BEEHLER TESTING STAND

The drive of the test head on this device is different from that usually employed for this work. The speed variation is secured by the use of a reversible variable speed 2-hp. electric motor. The machine to be tested is centered by securing its shaft to the universal three-jaw chuck. The vise is worthy of special mention as it is very readily adaptable to any machine regardless of its shape.

The variable speed motor gives a range of 25 to 2,000 r.p.m. in either direction. It is furnished for either A. C. or D. C.

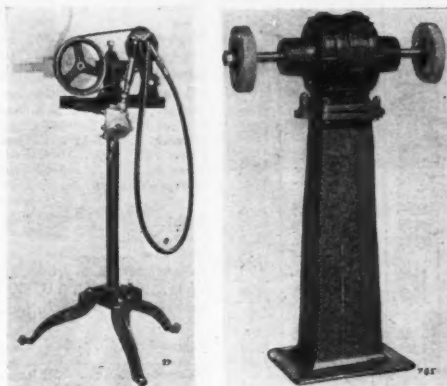
The switchboard is constructed of black marine slate, size 20 in. by 18 in., supported by land 1½-in. angle irons. The voltmeter has a range of 0 to 25 volts. The ammeter from 50-0-50 amperes. Relay and fuses are mounted back of the board, which is also fitted with a tachometer. Beehler Electrical Equipment Co., Yuma, Colo.

STORAGE BATTERY DISASSEMBLING BENCH

The battery bench shown has provision for removing the battery elements in a positive manner. By the utilization of a patented tong which grips both battery posts at the same time, the danger of broken posts is greatly reduced. The bench is fitted with an overhead conveyor to which the tongs are fastened. After the battery has been steamed the battery is placed on the bench, the tongs are fastened to the posts and by actuat-



Storage battery disassembling bench



Sioux flexible shaft attachment

Luther electric grinder



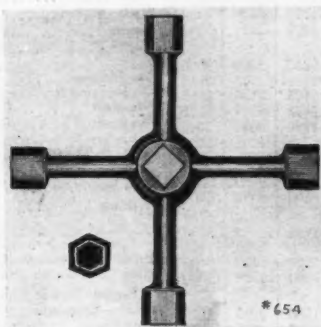
Master expansion reamer

ing the vise which holds the battery box and the trolley that hoists the elements from their anchorage, the battery is made ready for the necessary replacement of parts without having been touched by hand.

It is provided with drain connections which are installed about 6 in. above the bottom of tank to provide a sediment zone. The tank and drain board are hinged and are covered with sheet lead to prevent deterioration. The vise can be used for the straightening of warped plates. The tongs may be purchased separately and are priced at \$4.50 f. o. b. Mason City. The entire equipment retails for \$75 f. o. b. Mason City, and is manufactured by the Gutterman and Walsh Co.

FOUR POINT WRENCH

The Four Point wrench combines four hex opening wrenches in one piece. Its construction in the form of a cross affords equal and maximum leverage, no matter which opening is used. This wrench is also adaptable to the removal of rim lug nuts. Mor-Air Auto Pump Co., Aurora, Ill.



Four point wrench

SIoux FLEXIBLE SHAFT ATTACHMENT

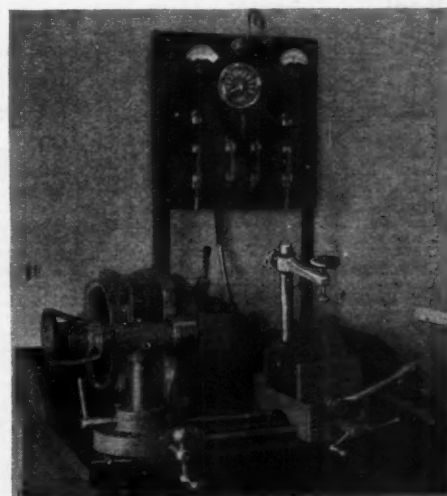
This flexible shaft attachment can be used for unlimited purposes, such as drilling, reaming, grinding, polishing, tire brushing, valve grinding, cleaning bodies, etc. It can be driven by any electric drill, one-half inch capacity or more, or can be driven direct from a line shaft, from a lathe, a drill press, emery wheel or almost any thing that will drive the shaft at a speed of 1000 to 1,725 r.p.m. Flexible shaft attachment complete with valve grinding attachment, as illustrated, \$90. Albertson & Co., Sioux City, Ia.

MASTER EXPANSION REAMERS

Master reamers are provided with six blades of high-grade tool steel, properly machined, hardened and ground. The nuts are heavier than usual and well hardened. The thread is cut to allow for gradual and positive adjustment of blades. New blades can be fitted without sending to the factory. Set No. 1 consists of eight reamers from A to H, ranging in sizes from 15-32 to 1 1-16 in. A hardwood case is provided. Price \$41.50. Master Products Co., 1142 Belmont avenue, Chicago.

LUTHER ELECTRIC GRINDER

The Dymo electric grinder arbor is of rigid construction, allowing liberal space between the bearings and the wheels. It is furnished with a high or low pedestal, as required. Tool rests and guards are furnished at a slight additional cost. The single phase machines are equipped with starting switch. Luther Grinder Mfg. Co., Milwaukee, Wis.



Beehler testing stand

Specifications of Current Passenger Car Models

NAME AND MODEL	En- gine Make	Cylinders, Bore and Stroke	WB	Tires	2- Pass.	5- Pass.	7- Pass.	Coupe	Sedan	NAME AND MODEL	En- gine Make	Cylinders, Bore and Stroke	WB	Tires	2- Pass.	5- Pass.	7- Pass.	Coupe	Sedan
Ambassador.....R	Cont.	6-3 1/2 x 5 1/4	136	33x5	14500	14500	14500	14500	14500	Maxwell.....25	Own.	4-3 1/2 x 4 1/2	109	31x4	\$ 885	\$ 885	1385	1485	
American.....C	H-S.	6-3 1/2 x 5	127	32x4	2195	2195	2195	2195	2195	McFarlan.....1921	Own.	6-4 1/2 x 6	140	33x5	6300	6300	7500	7500	
Anderson.....Series 40	Own.	6-3 1/2 x 4 1/2	120	33x4	2195	1650	1795	2450	2550	Mercer.....Series 5	Own.	4-3 1/2 x 6 1/2	132	32x4 1/2	3950	3950	4850	5250	
Apperson.....8-21-S	Own.	8-3 1/2 x 5	130	34x4 1/2	3000	3250	4500	4500	4500	Merit.....Cont.	Own.	6-3 1/2 x 4 1/2	119	32x4	1985	1985	2795	2895	
Apperson.....Anniversary	Own.	8-3 1/2 x 5	130	34x4 1/2	3500	3750	4500	4500	4500	Metz.....R & RR	Own.	4-4 1/2 x 6	129	32x4 1/2	5500	5500	7795	2895	
Auburn.....6-51	Cont.	6-3 1/2 x 4 1/2	121	32x4	1670	1695	1760	2475	2495	Metz.....M6	Rut.	6-3 1/2 x 5	120	32x4	1995	1995	2795	2895	
Beggs.....20T	Cont.	6-3 1/2 x 4 1/2	120	33x4	1775	1520	2320	2420	2420	Mitchell.....F-50	Own.	6-3 1/2 x 5	120	32x4	1490	1490	2290	2440	
Bel.....4-32	H-S.	4-3 1/2 x 5	114	31x4	1495	1495	1495	1495	1495	Mitchell.....F-50	Own.	6-3 1/2 x 5	120	33x4	1490	1490	2290	2440	
Bel.....6-50	H-S.	6-3 1/2 x 5	124	32x4	1695	1695	1695	1695	1695	Mitchell.....F-50	Own.	6-3 1/2 x 5	127	33x4	1795	1795	2795	2895	
Biddle.....B1 & B5	Buda.	4-3 1/2 x 5 1/2	121	32x4	3475	3475	4350	4350	4350	Moller.....A	Own.	4-2 1/2 x 4	100	27x3 1/2	2000	2000	2290	2440	
Birch Super-Four.....	H-S.	4-3 1/2 x 5	117	33x4	1195	1195	1245	1795	1795	Monroe.....S-9 & 10	Own.	4-3 1/2 x 4 1/2	115	32x3 1/2	1295	1295	2075	2175	
Birch Light Four.....	Leit.	4-3 1/2 x 4 1/2	108	30x3 1/2	995	995	995	995	995	Monroe.....S-11 & 12	Own.	4-3 1/2 x 4 1/2	115	33x4	1785	1785	2285	2785	
Birch Light Six.....	H-S.	4-3 1/2 x 5	117	33x4	1395	1395	1445	1995	1995	Moon.....6-48	Cont.	6-3 1/2 x 4 1/2	122	32x4	1785	1785	2285	2785	
Bour-Davis.....21S	Cont.	6-3 1/2 x 4 1/2	120	33x4 1/2	2385	2385	2385	2385	2385	Moon.....6-68	Cont.	6-3 1/2 x 4 1/2	122	32x4 1/2	2285	2285	2785	2785	
Brewster.....91	Own.	4-4 1/2 x 5 1/2	125	32x4 1/2	7000	7000	7000	7000	7000	Murray-Mac Six.....	Own.	6-3 1/2 x 5 1/2	128	34x4 1/2	4250	4250	4250	4250	
Briscoe, 4-34.....	Own.	4-3 1/2 x 5	109	31x4	1085	1085	1085	1085	1085	Nash.....681-7	Own.	6-3 1/2 x 5	121	33x4	1525	1545	1695	2395	
Buick, 1922-34-35-36-37	Own.	4-3 1/2 x 4 1/2	109	31x4	935	975	1475	1650	1650	Nash.....682	Own.	6-3 1/2 x 5	127	34x4 1/2	1695	1695	2395	2695	
Buick, 1922-44-5-6-7	Own.	6-3 1/2 x 4 1/2	118	33x4 1/2	1495	1525	2135	2435	2435	Nash Four.....41-A	Own.	4-3 1/2 x 5	112	33x4	1025	1045	1645	1835	
Buick, 1922-48-9-50	Own.	6-3 1/2 x 4 1/2	124	34x4 1/2	1495	1525	2135	2435	2435	National Sextet.....BB	Own.	6-3 1/2 x 5 1/2	130	32x4 1/2	2990	2990	4140	4240	
Bush.....E.C.4	Own.	4-3 1/2 x 5	116	33x4	1195	1195	1750	1850	1850	Noma.....1C	Cont.	6-3 1/2 x 4 1/2	128	32x4 1/2	2800	2850	3200	3700	
Bush.....E.C.6	Own.	6-3 1/2 x 5	116	33x4	1345	1345	1750	1850	1850	Norwalk.....430-KS	Lyc.	4-3 1/2 x 5	116	32x3 1/2	1035	1035	1625	1725	
Cadillac.....61	Own.	8-3 1/2 x 5 1/2	132	33x5	3790	3790	3940	4690	4950	Oakland.....34-D	Own.	6-2 1/2 x 4 1/2	115	32x4	1095	1145	1425	1525	
Case.....V	Cont.	6-3 1/2 x 4 1/2	126	34x4 1/2	1935	1935	1935	2970	2970	Ogren.....6-T	Cont.	6-3 1/2 x 5 1/2	134	33x5	4250	4250	5200	5500	
Chalmers.....6-30	Own.	6-3 1/2 x 4 1/2	117	32x4	1245	1295	1995	2295	2295	Oldsmobile.....43-A	Own.	4-3 1/2 x 5 1/2	115	32x4	1145	1145	1645	1845	
Chalmers.....6-30	Own.	6-3 1/2 x 4 1/2	122	33x4 1/2	1395	1395	1995	2295	2295	Oldsmobile.....37-A	Own.	6-2 1/2 x 4 1/2	112	32x4	1450	1450	2145	2145	
Champion.....Tourist	Lyc.	4-3 1/2 x 5	113	32x3 1/2	995	995	995	995	995	Oldsmobile.....46	Own.	8-2 1/2 x 4 1/2	122	33x4 1/2	1735	1735	2635	2635	
Champion.....Special	H-S.	4-3 1/2 x 5	118	32x4	1195	1195	1785	2785	2885	Oldsmobile.....47	Own.	8-2 1/2 x 4 1/2	115	32x4	1625	1625	2185	2425	
Chandler.....Six	Own.	6-3 1/2 x 5	123	33x4	1785	1785	2785	2885	2885	Overland.....4	Own.	4-3 1/2 x 4	100	30x3 1/2	595	595	895	895	
Chevrolet.....490	Own.	4-3 1/2 x 4	102	30x3 1/2	525	525	875	875	875	Packard.....Single-Six	Own.	6-3 1/2 x 4 1/2	116	33x4 1/2	2350	2350	3125	3350	
Chevrolet.....Chevrolet	Own.	4-3 1/2 x 5 1/2	110	32x4	975	975	1575	1575	1575	Packard.....Twin-Six	Own.	12-3 x 5	136	35x5	4850	4850	6600	6800	
Cleveland.....40	Own.	6-3 x 4 1/2	112	32x4	1295	1295	2195	2295	2295	Paige.....6-44	Own.	6-3 1/2 x 5	119	32x4	1635	1635	2450	2570	
Climber Four.....K	H-S.	4-3 1/2 x 5	115	33x4	1385	1385	3385	3685	3685	Paige.....6-66	Cont.	6-3 1/2 x 5	131	33x4 1/2	12975	13295	2875	3755	
Climber Six.....S	H-S.	6-3 1/2 x 5	125 1/2	32x4 1/2	2250	2250	3000	3100	3100	Pan American.....6-55	H-S.	6-3 1/2 x 5	121	33x4	2000	2000	2100	2100	
Cole.....870	North.	8-3 1/2 x 5	127 1/2	33x5	2485	2485	3385	3685	3685	Paterson.....650	Cont.	6-3 1/2 x 4 1/2	120	33x4	1595	1625	2695	2695	
Columbia Challenger.....	Rut.	6-3 1/2 x 5	115	32x4	1475	1475	1995	1995	1995	Peerless.....56-S-7	Own.	8-3 1/2 x 5	125	34x4 1/2	2880	2880	3500	3790	
Columbia.....D-C & CS	Cont.	6-3 1/2 x 4 1/2	115	32x4	1475	1475	2295	2350	2350	Piedmont.....4-30	Lyc.	4-3 1/2 x 5	116	32x3 1/2	970	970	1625	1625	
Comet.....C-53	Cont.	6-3 1/2 x 5 1/2	125	33x4 1/2	2350	2450	3650	3650	3650	Piedmont.....4-40	Cont.	6-3 1/2 x 4 1/2	122	32x4	1285	1285	1650	1650	
Commonwealth.....44	H-S.	4-3 1/2 x 5	117	32x4	1395	1395	2465	2465	2465	Pierce-Arrow.....	Own.	6-4 x 5 1/2	138	33x5	7000	6500	8000	8500	
Crawford.....22-6-40	Cont.	6-3 1/2 x 5 1/2	122 1/2	32x4	3000	3000	4500	4500	4500	Pilot.....4-45	Teetor	6-3 1/2 x 5	120	32x4	1945	1895	2895	3100	
Crow-Elkhart.....L63-65	Lyc.	6-3 1/2 x 5	117	32x3 1/2	1295	1295	2395	2395	2395	Pilot.....6-50	H-S.	6-3 1/2 x 5	126	32x4 1/2	2285	2285	2335	3350	
Crow-Elkhart.....S63-65	H-S.	6-3 1/2 x 5	117	33x4	1545	1545	2395	2395	2395	Porter.....46	Own.	4-4 x 6 1/2	142	33x5	6750	6750	7800	7800	
Daniels.....D-19	Own.	8-3 1/2 x 5 1/2	132	34x4 1/2	5350	5350	6250	6950	6950	Premier.....6-D	Own.	6-3 1/2 x 5 1/2	126 1/2	33x5	3700	3690	4600	5190	
Davis.....61-67	Cont.	6-3 1/2 x 4 1/2	120	33x4 1/2	1895	1795	2295	2595	2595	Premier.....6-40 A	Falls.	6-3 x 4 1/2	117	32x4	1295	1295	1945	1995	
Dixie Flyer.....H-S-70	H-S.	4-3 1/2 x 5	112	32x4	1195	1195	1395	1895	1895	Raleigh.....A-6-60	H-S.	6-3 1/2 x 5	122	32x4 1/2	2250	2250	3100	3200	
Dodge Brothers.....	Own.	4-3 1/2 x 4 1/2	114	32x4	935	985	1585	1785	1785	R & V Knight.....R	Own.	4-3 x 5	116	32x4	1850	1850	2650	2750	
Dorris.....6-80	Own.	6-3 x 5	132	33x5	1785	1785	5800	7190	7190	R & V Knight.....J	Own.	6-3 1/2 x 5 1/2	127	32x4 1/2	3350	3350	4000	4200	
Dort.....19-14	D-Ly.	4-3 1/2 x 5	109	31x4	985	985	1535	1685	1685	Ranger 22-4.....A-B-C-D	Own.	4-3 1/2 x 5	116	32x4	1485	1485	2100	2250	
Driggs.....A	Own.	4-3 1/2 x 4 1/2	104	30x3 1/2	1275	1275	1535	1685	1685	Ranger 22-6.....A-B-C-D	Own.	6-3 1/2 x 5	123	33x4 1/2	3550	3550	4500	4500	
Du Pont.....A	Own.	4-3 1/2 x 5 1/2	124	32x4 1/2	3400	3400	4500	4900	4900	Reg Series.....B, T & U	Own.	6-3 1/2 x 5	120	33x4	1650	1650	2700	2750	
Durant.....A-22	Own.	4-3 1/2 x 4 1/2	109	31x4	890	890	1365	1365	1365	Revere.....C	Dues.	4-4 1/2 x 6	131	32x4 1/2	4850	4650	6500	6500	
Earl.....40	Own.	4-3 1/2 x 5 1/2	112	32x4	1375	1285	1995	1995	1995	Roamer.....6-54-E	Cont.	6-3 1/2 x 5 1/2	128	32x4 1/2	2750	2485	3390	3950	
Elcar.....K-4	Lyc.	4-3 1/2 x 5	117	33x4	1145	1145	1545	1645	1645	Roamer.....4-75-E	Dues.	4-4 1/2 x 6	128	32x4 1/2	3850	3650	4750	4750	
Elcar.....7-R	Cont.	6-3 1/2 x 4 1/2	117	33x4	1595	1595	2395	2495	2495	Rolls-Royce.....	Own.	6-4 1/2 x 4 1/2	143 1/2	33x5	U. S. Chassis Price	11750	11750		
Elgin.....K-1	Falls.	6-3 1/2 x 4 1/2	118	33x4	1595	1495	2395	2395	2395	Romer.....	Cont.	6-3 1/2 x 4 1/2	130	33x4	1975	2050	2400	2700	
Essex.....	Own.	4-3 1/2 x 5	108 1/2	32x4	1195	1195	1495	1995	1995	Saxon.....125	Own.	4-3 1/2 x 5	112	32x4	1295	1295	1995	1995	
Falcon.....4	Own.	4-3 1/2 x 5	115	32x4	1295	1295	1990	2085	2085	Sayers Six.....DP	Cont.	6-3 1/2 x 4 1/2	118	33x4	1745	1745	2995	2995	
Falcon.....6	Own.	6-3 1/2 x 5	115	32x4	1595	1595	2295	2395	2395	Seneca.....L & O	LeR.	4-3 1/2 x 4 1/2	108	30x3 1/2	1045	1045	2100	2250	
Ferguson.....S-5-21	Own.	6-3 1/2 x 5	126	33x4 1/2	1595	1595	2295	2395	2395	Severin.....Six	Cont.	6-3 1/2 x 5 1/2	122 1/2	33x4 1/2	1485	1485	2100	2250	
Ferris.....C-20	Cont.	6-3 1/2 x 5 1/2	130	32x4 1/2	2695	2695	3895	3895	3895	Severin.....Six	Cont.	6-3 1/2 x 5 1/2	122 1/2	33x5	2550	2550	3250	3350	
Ford.....T	Own.	4-3 1/2 x 4	109	30x3 1/2	3225	3355	595	660	660	Southern Six.....660-2	H-S.	6-3 1/2 x 5	127	32x4 1/2	2375	2375	2395	2395	
Franklin.....9-B	Own.	6-3 1/2 x 4	115	32x4	2300	2350	2650	3350	3350	Sperling, A.....	Supr.	4-3 1/2 x 5	114	32x4	980	980	1685	1685	
Gardner.....T-R & G	Lyc.	4-3 1/2 x 5	112	32x3 1/2	1095	1095	1695	1695	1695	Standard.....J	Own.	8-3 1/2 x 5	127	34x4 1/2	3400	3400	4500	4800	
Grant.....Special	Own.	6-3 1/2 x 4 1/2	116	32x4	1285	12													

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Acason	3/4	\$1650	3 1/2 x 5	34x5 1/2	34x5 1/2	W	Corbitt, H	3/4-1	\$1800	3 1/2 x 5	35x5 1/2	35x5 1/2	B	Garford, 77D	3 1/2	\$4300	4 1/2 x 6	36x5	36x6d	W
Acason, R	1	2260	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Corbitt, E	1	2200	3 1/2 x 5	34x3 1/2	34x4	W	Garford, 68D	5	5200	5 x 6 1/2	36x6	40x6d	W
Acason, RB	1 1/2	2485	3 1/2 x 5 1/2	36x3 1/2	36x6	W	Corbitt, D	1 1/2	2600	3 1/2 x 5	36x3 1/2	36x5	W	Garford, 150-A	7 1/2	5500	5 1/2 x 6 1/2	36x6	40x7d	W
Acason, H	2 1/2	3295	4 1/2 x 5 1/2	36x4	36x8*	W	Corbitt, C	2	3150	4 1/2 x 5 1/2	36x3 1/2	36x7	W	Gary, F	1	2100	3 1/2 x 5	36x3 1/2	36x4	W
Acason, L	3 1/2	4295	4 1/2 x 5 1/2	36x5*	36x10*	W	Corbitt, B	2 1/2	3300	4 1/2 x 5 1/2	36x4	36x7	W	Gary, I	1 1/2	2550	4 x 5 1/2	36x3 1/2	36x5	W
Acason, M	5	5250	5 x 6 1/2	36x6	40x12	W	Corbitt, A	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x10	W	Gary, J	2 1/2	3150	4 1/2 x 5 1/2	36x4	36x7	W
Ace, C	1 1/2	2295	3 1/2 x 5 1/2	34x3 1/2	34x5*	W	Corbitt, AA	5	5000	4 1/2 x 6	36x6	40x6d	W	Gary, K	3 1/2	4050	4 1/2 x 6	36x5	40x5d	W
Ace, A	2 1/2	2795	4 1/2 x 5 1/2	36x4	36x7	W	Day-Elder, A	1	1600	3 1/2 x 5	34x3 1/2	34x4	W	Gary, M	5	5150	5 x 6 1/2	36x6	40x6d	W
Acme, G	3/4	....	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Day-Elder, B	1 1/2	2000	3 1/2 x 5	34x3 1/2	34x5	W	Gersix, K	1 1/2	3100	4 x 5 1/2	36x3 1/2	36x7	W
Acme, B	1	....	3 1/2 x 5	34x3 1/2	34x5	W	Day-Elder, D	2	2400	4 1/2 x 5 1/2	36x4	36x7	W	Gersix, K	2 1/2	3500	4 1/2 x 5 1/2	36x4	36x8	W
Acme, F	1 1/2	....	3 1/2 x 5	34x3 1/2	34x5	W	Day-Elder, C	2 1/2	2750	4 1/2 x 5 1/2	36x4	36x7	W	Gersix	3 1/2	4500	4 1/2 x 6	36x5	40x12	W
Acme, A	2	....	4 1/2 x 5 1/2	36x4	36x7*	W	Day-Elder, E	5	4250	4 1/2 x 6	36x5*	40x6d*	W	Golden West, GH	3	4500	4 1/2 x 6	36x7	36x7	W
Acme, AC	2 1/2	....	4 1/2 x 5 1/2	36x4	36x7*	W	Day-Elder, F	2 1/2	3150	4 1/2 x 5 1/2	36x5*	40x6d*	W	Golden West, G	3 1/2	5000	4 1/2 x 6	36x6	36x6	W
Acme, C	3 1/2	....	4 1/2 x 5 1/2	36x5	40x10	W	Day-Elder, E	5	4250	4 1/2 x 6	36x5*	40x6d*	W	Graham Bros. A	1 1/2	2495	3 1/2 x 5	35x5 1/2	36x6*	I
Acme, E	5	....	4 1/2 x 6	36x6	40x12	W	Dearborn, E	1	1700	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W	Gramm-Bern, 10	1	1365	3 1/2 x 5	33x5 1/2	33x5 1/2	E
Akr'n Multi-Trk20	1 1/2	1695	4 x 5 1/2	34x5	34x5	B	Dearborn, FX	1 1/2	2300	3 1/2 x 5 1/2	34x4	34x5	W	Gramm-Bern, 15	1 1/2	2050	3 1/2 x 5	36x3 1/2	36x5*	I
American, 25	2 1/2	3350	4 x 6	36x4*	36x4d*	W	Dearborn, F	1 1/2	2180	3 1/2 x 5 1/2	34x4*	34x5*	W	Gramm-Bern, 20	2	2725	3 1/2 x 5	36x3 1/2	36x5	W
American, 40	4	4275	4 1/2 x 6	36x5	36x5d	W	Dearborn, 48	2	2590	3 1/2 x 5 1/2	35x5 1/2	34x7*	W	Gramm-Bern, 25	2 1/2	3175	4 1/2 x 5 1/2	36x4*	36x7*	W
Apex, G	1	1450	3 1/2 x 5	33x5 1/2	33x5 1/2	I	Defiance, G	1	1695	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Gramm-Bern, 30	2 1/2	3575	4 1/2 x 5 1/2	36x4*	36x4d*	W
Apex, D	1 1/2	1915	3 1/2 x 5 1/2	34x3 1/2	34x4	I	Defiance, D	1 1/2	2095	3 1/2 x 5	35x5 1/2	36x6	I	Gramm-Bern, 35	3 1/2	4375	4 1/2 x 5 1/2	36x5	40x5d*	W
Apex, E	2 1/2	2695	4 1/2 x 5 1/2	36x4	36x7	I	Defiance, E	2	2275	3 1/2 x 5	35x5 1/2	38x7 1/2	I	Gramm-Bern, 50	5	5275	4 1/2 x 6	36x6	40x6d*	W
Apex, F	3 1/2	3975	4 1/2 x 6	36x5	36x10	I	DeMartini, 1 1/2	1 1/2	2600	3 1/2 x 5	34x3 1/2	34x6	W							
Armleder, 20	1	....	3 1/2 x 5 1/2	34x3 1/2	34x5*	W	DeMartini, 2	2	3300	4 x 5 1/2	36x3 1/2	36x7	W	Hahn, J4	1	....	3 1/2 x 5	34x5*	34x5*	W
Armleder, HW	2 1/2	....	4 1/2 x 5 1/2	36x4	36x7*	W	DeMartini, 3	3	4250	4 1/2 x 5 1/2	36x4	36x10	W	Hahn, CD	1 1/2	....	4 1/2 x 5 1/2	36x3 1/2	36x6*	W
Armleder, KW	3 1/2	....	4 1/2 x 6	36x5	36x5d	W	DeMartini, 4	4	4800	4 1/2 x 6	36x5	36x12	W	Hahn, EE	2 1/2	....	4 1/2 x 5 1/2	36x4*	36x8*	W
Atco, B	1 1/2	....	3 1/2 x 5 1/2	34x5 1/2	36x6	I	Denby, 31	1 1/2	1625	3 1/2 x 5	35x5	35x5	B	Hahn, F	3 1/2	....	4 1/2 x 5 1/2	36x5*	36x10*	W
Atco, A1	1 1/2	....	3 1/2 x 5 1/2	34x5 1/2	36x6	I	Denby, 33	1 1/2	2300	3 1/2 x 5	35x5 1/2	38x7 1/2	I	Hahn, EF	5	....	4 1/2 x 6	36x6	40x12	W
Atco, A	2 1/2	....	4 1/2 x 5 1/2	36x4	36x8*	W	Denby, 34	2	2600	3 1/2 x 5	36x3 1/2	36x6	I	Hal-Fur, E	1 1/2	2350	4 x 5 1/2	34x5 1/2	38x7 1/2	W
Atlas, M.D.	1	1185	3 1/2 x 5	32x4 1/2	32x4 1/2	W	Denby, 25	3	3300	4 1/2 x 5 1/2	36x4	36x7	I	Hal-Fur, B	2 1/2	3000	4 1/2 x 5 1/2	35x5*	38x7*	W
Atterbury, 20R	1 1/2	2475	3 1/2 x 5	34x3 1/2	34x5	W	Denby, 27	4	4200	4 1/2 x 5 1/2	36x5	36x5d	I	Hal-Fur, F	3 1/2	4000	4 1/2 x 5 1/2	36x6	40x10 1/2	W
Atterbury, 7CX	2 1/2	3175	4 1/2 x 5 1/2	36x4	36x4d	W	Dependable, A	3/4-1	1650	3 1/2 x 5	34x5	36x6	W	Hall, 1 1/2	1 1/2	3100	3 1/2 x 5	34x5	38x7 1/2	W
Atterbury, 7D	3 1/2	3975	4 1/2 x 5 1/2	36x5	40x5d	W	Dependable, C	1 1/2	2350	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Hall, 2 1/2	2 1/2	3275	4 1/2 x 5 1/2	36x4	36x6	W
Atterbury, 8E	5	4975	4 1/2 x 6	36x5	40x6d	W	Dependable, D	2	2650	4 x 5 1/2	34x5	36x6	W	Hall, 3 1/2	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	W
Autocar, 21UF	1 1/2-2	2300	4 1/2 x 5 1/2	34x4*	34x5*	D	Dependable, E	2 1/2	2950	4 1/2 x 5 1/2	36x4	36x7	W	Hall, 5	5	5100	4 1/2 x 5 1/2	36x5	40x6d	W
Autocar, 21UG	1 1/2-2	2400	4 1/2 x 5 1/2	34x4*	34x5*	D	Dependable, G	3 1/2	3550	4 1/2 x 5 1/2	36x6	38x7	W	Hall, 7 chain	7	5100	4 1/2 x 5 1/2	36x5	40x6d	C
Autocar, 26Y	....	4350	4 1/2 x 5 1/2	34x6	36x12	D	Diamond T, O	1-1 1/2	1975	3 1/2 x 5 1/2	36x3 1/2	36x4	W	Harvey, WEA	1 1/2	2550	4 1/2 x 5 1/2	34x3 1/2	34x5	W
Autocar, 26-B	....	4500	4 1/2 x 5 1/2	34x6	36x12	D	Diamond T, FS	1 1/2	2525	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Harvey, WOA	2	2950	4 1/2 x 5 1/2	34x4	34x7	W
Available, H1 1/2	1 1/2	2475	4 x 5 1/2	36x3 1/2	36x5*	W	Diamond T, T	1 1/2	2250	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Harvey, WFA	2 1/2	3300	4 1/2 x 5 1/2	36x4	36x7	W
Available, H2	2	2775	4 x 5 1/2	36x3 1/2	36x6*	W	Diamond T, U	2	2650	4 x 5 1/2	36x4	36x7	W	Harvey, WHA	3 1/2	3950	4 1/2 x 6	36x5	36x5d	W
Available, H2 1/2	2 1/2	3475	4 x 5 1/2	36x4	36x8*	W	Diamond T, K	3 1/2	3750	4 1/2 x 5 1/2	36x5	36x5d	W	Harvey, WKA	5	4500	4 1/2 x 6	36x6	40x6d	W
Available, H3 1/2	3 1/2	4475	4 1/2 x 5 1/2	36x5	40x5d	W	Diamond T, EL	5	4325	4 1/2 x 5 1/2	36x6	40x6d	W	Hawkeye, K	1 1/2	1850	3 1/2 x 5 1/2	34x3 1/2	34x5*	I
Available, H5	5	5375	4 1/2 x 6	36x6	40x12	B	Diamond T, S	5	4500	4 1/2 x 6	36x6	40x6d	W	Hawkeye, M	2	2650	4 1/2 x 5 1/2	36x4*	36x6*	I
Available, H7	7	6000	5 x 6	36x6	40x14	B	Diehl, A	1	....	3 1/2 x 5	34x4 1/2	35x5	I	Hawkeye, N	3 1/2	3700	4 1/2 x 6	36x5*	36x10*	I
Avery	1	....	3 x 4	34x5 1/2	34x5 1/2	I	Diehl, B	1 1/2	....	3 1/2 x 5	36x6	36x6	I	Hendrickson, N	3 1/2	3150	4 1/2 x 5 1/2	36x4*	36x7*	W
Beck, A Jr.	1	1950	3 1/2 x 5	34x3 1/2	34x4	I	Dispatch, F	1	1350	3 1/2 x 5	34x4 1/2	34x4 1/2	I	Hendrickson, M	3 1/2	3975	4 1/2 x 5 1/2	36x5*	36x5d*	W
Beck, C	2	2550	4 1/2 x 5 1/2	36x4	36x6	W	Doane	2 1/2	4100	4 1/2 x 5 1/2	36x5	36x7	C	Huffman, B	1 1/2	1995	3 1/2 x 5	34x3 1/2	34x6	W
Bell, M	1	1495	3 1/2 x 5 1/2	35x5	35x5 1/2	W	Doane	3 1/2	5100	4 1/2 x 5 1/2	36x5	36x5d	C	Huffman, C	1 1/2	1795	3 1/2 x 5 1/2	34x3 1/2	34x6	I
Bell, E	1 1/2	2100	3 1/2 x 5 1/2	34x3 1/2	34x5 1/2	W	Doane	6	6000	5										

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL										NAME AND MODEL									
Tons Capacity		Chassis Price	Bore and Stroke		TIRES		Final Drive	Tons Capacity		Chassis Price	Bore and Stroke		TIRES		Final Drive				
			Front	Rear	Front	Rear					Front	Rear							
Kelly-S, K-45										Signal, R									
Kelly-S, K-50										Southern, 10									
Kelly-S, K-60										Southern, 15									
Keystone, 40										Southern, 20									
Kimball, AB										Standard, 1-K									
Kimball, AC										Standard, 76									
Kimball, AE										Standard, 66									
Kimball, AF										Standard, 5-K									
Kissel, Express										Sterling, 1 1/2									
Kissel, Utility										Sterling, 2									
Kissel, Freight										Sterling, 2 1/2									
Kissel, H. D.										Sterling, 3 1/2									
Kleiber, AA										Sterling, 5-W									
Kleiber, AB										Sterling, 5-C									
Kleiber, BB										Sterling, 7 1/2									
Kleiber, C										Stewart, 14									
Kleiber, D										Stewart, 15									
Koehler, D										Stewart, 7-X									
Koehler, M										Stewart, 10-X									
Koehler, MCS										Stoughton, C									
Koehler, F										Stoughton, B									
Koehler, MT, Trac										Stoughton, D									
Lange, B										Stoughton, F									
Larrabee, X-Z										Sullivan, E									
Larrabee, U										Sullivan, H									
Larrabee, K										Superior, D									
Larrabee, L-4										Superior, E									
Larrabee, W										Superior, 50									
Luedinghaus, C										Superior, 70									
Luedinghaus, W										Superior, 100									
Luedinghaus, K										Superior, 150									
Maccari, L										Texan, A38									
Maccari, H-A										Texan, TK39									
Maccari, H-2										Tiffin, GW									
Maccari, M-2										Tiffin, MW									
Maccari, G										Tiffin, PW									
MacDonald, A										Tiffin, F50									
Mack, AB D.R.										Tiffin, F60									
Mack, AB										Titan, HT									
Mack, AB Chain										Titan, HD									
Mack, AB Chain										Titan, TS									
Mack, AB D.R.										Tower, J									
Mack, AC Chain										Tower, H									
Mack, AC Chain										Tower, G									
Mack, AC Chain										Traffic, C									
Mack, AC Chain										Transport, 20									
Mack Trac, AB										Transport, 30									
Mack Trac, AC										Transport, 50									
Mack Trac, AC										Transport, 70									
Mack Trac, AC										Traylor, B									
Mack Trac, AC										Traylor, C									
Mapleleaf, AA**										Traylor, E									
Mapleleaf, BB**										Traylor, F									
Mapleleaf, CC**										Triangle, AA									
Mapleleaf, DD**										Triangle, C									
Master, JW										Triangle, B									
Master, W										Triangle, G									
Master, D										Triumph, HC									
Master, A										Triumph, HB									
Master, E										Twin City, A.W.									
Master, B										Twin City, B									
Master, F										Twin City, C									
Master Trac, T										Twin City, A									
Maxwell, 1 1/2										Ultimate, A									
Memomines, HT										Ultimate, AJ									
Memomines, H										Ultimate, AJL									
Memomines, D										Ultimate, B									
Memomines, G										Ultimate, BL									
Memomines, J-3										Union, FW									
Moline, 10										Union, HW									
Moreland, 21B										Union, JW									
Moreland, 21C										United, A									
Moreland, 21H										United, B									
Moreland, 21J										United, C									
Napoleon, 7										United, V									
Napoleon, 9										United States, N									
Napoleon, 11										United States, R									
Nash, 2018										United States, S									
Nash, 2018										United States, T									
Nash, Quad.										Velie, 46									
Nash, 5018										Veteran, E**									
Nelson, F1 1/2										Veteran, A**									
Nelson, F2										Veteran, D**									
Nelson, F3 1/2										Veteran, H**									
Nelson, FCS										Vim, 29									
Netro, D										Vim, 30									
Netro, H										Vim, 31									
New York, M										Vim, 32									
New York, N										Vim, 33									
Niles, E										Vim, 34									
Noble, H30										Vim, 35									
Noble, C40										Vim, 36									
Noble, D50										Vim, 37									
Noble, E70										Vim, 38									
Northway, B-2										Vim, 39									
Northway, B-3										Vim, 40									
Northwestern W										Vim, 41									
Northwestern WS										Vim, 42									
Norwalk, 25E										Vim, 43									
Norwalk, 35E										Vim, 44									
Norwalk, 35E-Spec										Vim, 45									

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front Rear	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front Rear	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front Rear	Final Drive
Ward-LaF., 4A	3½	\$4990	4½x6½	36x5 36x5d	W	Wichita, RX	2½	\$3600	4½x6	36x4 36x8	W	Winther, 751	1	\$1795	3½x5	34x4½ 35x5½	I
Ward-LaF., 5A	5	5590	5 x6½	36x5 40x6d	W	Wichita, O	3½	4000	4½x6	36x5 36x5d	W	Winther, 430	1½	2850	3½x5	32x4 32x4	I
Watson, E	1	1785	3½x5½	35x5½ 35x5½	W	Wichita, S	5	5000	4½x6	36x6 40x6d	W	Winther, 39	1½	2450	3½x5	34x3½ 34x5	I
Watson, N	1	3825	4½x5½	36x5 36x10	W	Wilcox, AA	1	1900	3½x5½	36x4 36x4	W	Winther, 49	2	3250	4 x5	34x4 34x4d	I
Western, W1½	1½	2550	4½x5½	36x3½ 36x5*	W	Wilcox, BB	1½	2550	4½x5	36x4 36x5	W	Winther, 50	2½	3905	4 x6	38x7½ 42x9½	I
Western, L1½	1½	2550	3½x5	36x3½ 36x5*	W	Wilcox, D	2½	3000	4½x5	36x4 36x3½d	W	Winther, 70	3½	4200	4 x6	36x5 36x5d	I
Western, W2½	2½	3250	4½x5½	36x4 36x7	W	Wilcox, E	3½	3950	4½x6	36x5 36x5d	W	Winther, 450	2½	3690	4 x5	34x5 36x6	I
Western, L2½	2½	3250	4½x6	36x4 36x7	W	Wilcox, F	5	4350	4½x6½	36x5 40x6d	W	Winther, 109	5	5250	4½x6	36x6 40x5d	I
Western, W3½	3½	4250	4½x6½	36x5 40x5d	W	Wilson, F	1½	2270	3½x5	36x3½ 36x5	W	Winther, 140	7	5000	5 x6	36x6 40x7d	I
White, 15	3	2400	3½x5½	34x5½ 34x5½	B	Wilson, EA	2½	2825	4½x5½	36x4 36x7	W	Wisconsin, B	1	1950	4 x5	34x5½ 34x5½	W
White, 20	2	3250	3½x5½	36x4 36x7	D	Wilson, G	3½	3635	4½x5½	36x5 36x5d	W	Wisconsin, C	1½	2500	4½x5½	36x6½ 36x6½	W
White, 40	3½	4200	3½x5½	36x5 40x5d	D	Wilson, H	5	4520	4½x6	36x6 40x6d	W	Wisconsin, D	2½	3500	4½x6½	36x6 36x10	W
White, 45	5	4500	4½x6	36x6 40x6d	D							Wisconsin, E	3½	4000	5 x6½	36x6½ 36x12½	W
White Hick., E	1½	1225	3½x5	34x5½ 34x5½	D							Witt-Will, N	1½	2750	3½x5	36x3½ 36x5*	W
White Hick., H	1½	1375	3½x5	36x3½ 36x5	W							Witt-Will, P	2½	3250	4½x5½	36x3½ 36x7*	W
White Hick., K	2½	1675	3½x5	36x4 36x5	W							Wolverine, J	1	2125	3½x5	34x3 34x5	I
Wichita, K	1	2380	3½x5½	36x3½ 36x4*	W							Wolverine, J	1½	2375	3½x5	34x3½ 34x5	I
Wichita, L	1½	2600	3½x5½	36x3½ 36x5*	W							Wolverine, J	2	2640	3½x5	34x4 34x7	I
Wichita, M	2	2800	3½x5½	36x3½ 36x6*	W							Wolverine, J	2½	3425	4½x5½	36x5 36x10	I
Wichita, R	2½	3000	3½x5½	36x4 36x7*	W							Wolverine, L	3½	4100	4½x5½	36x5 36x10	I

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl.
 Trac., Tractor. **Canadian made.
 Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid.
 †Price includes body. ‡Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
All-In One.....	10-30	\$1975	3	Clim.	4-5 x6½	GDK	3-4	Grain Belt.....A	18-36	\$2150	4	Wauk.	4-4½x6½	G or K	4	Port Huron.....A	12-25	\$1500	4	Chief	4-3½x8	G,K	3
Allis-Chalm. B	6-12	925	2	LeR.	4-3½x6½	Gas.	1-2	Gray.....1920	18-36	2000	3	Wauk.	4-4½x6½	Gas.	4	Ranger Cal. T-20	8-16	.....	4	LeR.	4-3½x4½	Gas.	1
Allis-Chalm. G.P	6-12	795	2	LeR.	4-3½x6½	Gas.	1-2	Ground Hog.....	19-31	2000	4	Erd.	4-4 x6	G or K	3	Reed.....A-1	15-30	1985	4	Wauk.	4-4½x6½	G or K	3-4
Allis-Chalm. L	12-20	1350	2	Midw.	4-4½x6½	Gas.	2-3	Gt. Western St.	20-30	1950	4	Beav.	4-4½x6	K	4	Reliable.....	18-36	2185	4	Wauk.	4-5 x6½	Gas.	4
Allis-Chalm. M	18-30	2150	4	Own	4-4½x6½	Gor K	3-4	Hart-Parr.....20	20	945	4	Own	2-5½x6½	K,D	2	Shawnee Com.	10-20	885	4	Own	2-6 x7	Ker.	2
Allis-Chalm. N	10-18	875	4	Own	4-4½x6½	G,K	3	Hart-Parr.....30	30	1295	4	Own	2-6½x7	K,D	3	Shelby.....C	12-25	1600	4	Wauk.	4-4½x5½	Gor K	3
Allwork.....2-G	14-28	1775	4	Own	4-5 x6	Gor K	3	Heider.....D	9-16	1170	4	Wauk.	4-4½x6½	G,K	3	Shelby.....D	12-24	1500	4	Own	4-4½x5½	Gor K	2-3
Allwork.....C	14-28	1525	4	Own	4-5 x6	Gor K	3	Heider.....C	12-20	1395	4	Wauk.	4-4½x6½	G,K	3	Shelby.....E	15-30	2200	4	Own	4-5 x6½	Gor K	3-4
Andrews Kin.D	18-36	2500	4	Clim.	4-5 x6½	Gor K	4	Heider.....Cult	6-10	1050	4	LeR.	4-3½x4½	Gas.	1	Shelby.....F	20-35	3000	4	Own	4-5½x7	Gor K	4-5
Appleton.....	12-20	1500	4	Buda	4-4½x5½	G,K	2-3	Hicks.....	20-30	.....	4	.....	4-4½x6	K or G	4	Shelby.....G	30-60	5000	4	Own	4-8 x10	Gor K	8-10
ARO.....1921-22	3-5	495	4	Own	1-4½x5	Gas.	1	Huber Light 4	12-25	1185	4	Wauk.	4-4½x5½	Gor K	3	Samson.....M	10-20	1250	4	Nor	4-4 x5½	G,K	2
Ault-nan-T.....	15-30	2200	4	Clim.	4-5 x6½	G,K	4	Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas.	3	Sandusky.....J	10-20	1250	4	Own	4-4½x5½	G,K,D	2
Ault-nan-T.....	22-45	3420	4	Own	4-5½x6	G,K	6	Illinois Super	18-30	.....	4	Clim.	4-5 x6½	G,K	4	Sandusky.....E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Ault-nan-T.....	30-60	4500	4	Own	4-7 x9	G,K,D	8	Imperial.....C	40-70	4500	4	Own	4-7½x9	G,K,D	10	Shawnee Com.	6-12	.....	2	LeR.	4-3½x4½	Gas.	1
Automot. B-3	12-24	1785	4	Herco.	4-4 x5	Gas.	2-3	Indiana.....F	5-10	895	2	LeR.	4-3½x4½	Gas.	1-2	Shawnee Com.	9-18	.....	2	Gray	4-3½x5	G,K	3
Avery, SR.Cul	5-10	.....	4	Own	4-3 x4	G,K	2	International	8-16	900	4	Own	4-4½x5	G,K,D	2	Shelby.....D	15-30	.....	4	Beav.	4-4½x6	G,K	3
Avery.....Cult-C	5-10	.....	3	Own	4-3 x4	G,K	2	International	15-30	1750	4	Own	4-4½x5	G,K,D	4	Shelby.....C	10-20	.....	4	Erd.	4-4 x6	Gor K	2-3
Avery.....B	8-16	.....	4	Own	2-5½x6	G,K,D	2-3	J-T.....N	20-40	.....	2	Chief	4-4½x6	G,K,D	3-4	Short Turn.....	20-40	1500	3	Beav.	4-4½x6	G,K	3
Avery.....	12-20	.....	4	Own	2-6½x7	G,K,D	2-3	Knudsen.....1920	16-32	1475	4	Clim.	4-5 x6½	.....	4-6	Steady Pull.....	12-24	1485	4	Own	4-4 x5	Gas.	3
Avery.....	12-25	.....	4	Own	2-6½x7	G,K,D	3-4	LaCrosse.....F	25-45	2500	4	Own	4-5 x9	.....	4-6	Stinson.....4E	18-36	1835	4	Beav.	4-4½x6	G,K	4
Avery.....	14-28	.....	4	Own	2-6½x7	G,K,D	3-4	LaCrosse.....M	6-12	650	4	Own	2-4 x6	G,K	1	Stone.....	20-40	2250	4	Beav.	4-4½x6	G,K	4
Avery.....	18-36	.....	4	Own	2-6½x7	G,K,D	4-5	LaCrosse.....G	12-24	985	4	Own	2-6 x7	G or K	3	Tiga.....3	15-27	2625	4	Wisc.	4-4½x6	Gas.	3-4
Avery.....	25-50	.....	4	Own	2-6½x7	G,K,D	5-6	Lauson.....5	12-25	1495	4	Midw.	4-4½x6½	Gas.	3	Titan.....	10-20	900	4	Own	2-6½x8	G,K,D	3
Avery.....	45-65	.....	4	Own	2-7½x8	G,K,D	8-10	Lauson.....20	15-35	1885	4	Beav.	4-4½x6	Gor K	3-4	Topp.....B	30-45	3500	4	Wauk.	4-4½x6½	Gas.	2-4
Bates.....	15-25	.....	4	Own	4-4½x8	Ker.	3	Lauson.....21	15-30	1985	4	Beav.	4-4½x6	Gor K	3-4	Tore Cultivator	6-10	.....	3	LeR.	4-3½x4½	Gas.	3
Bates Mule.....H	15-25	.....	4	Midw.	4-4½x6½	Gas.	3	Lauson Road	15-30	2225	4	Beav.	4-4½x6	G,K,D	2-3	Townsend.....	10-20	895	2	Own	4-6½x7	Ker.	2-3
Bates Mule.....F	18-25	.....	2	Midw.	4-4½x6½	Gas.	3	Leader.....B	12-18	1095	4	Own	2-6 x6½	G,K,D	2-3	Townsend.....	15-30	1485	2	Own	4-7 x8	Ker.	3-4
Bates Mule.....G	25-35	.....	2	Midw.	4-4½x6½	Gas.	com.	Leader.....GU	18-32	1985	4	Clim.	4-5 x6½	G,K	3-4	Townsend.....	25-50	2750	2	Own	4-8½x10	Ker.	4-5
Best.....	30	3100	2	Own	4-4½x6½	G,K,D	4	Leader.....W	20-30	2530	4	Clim.	4-5 x6½	G,K	3-4	Tractor Motor	40-50	.....	4	8-3½x5	Gas.	4-5	
Best.....	60	5450	2	Own	4-6½x8½	G,K,D	8-9	Leonard.....E	20-30	2550	4	Buda	4-4½x6	G,K	3	Traylor.....TB	6-12	715	4	LeR.	4-3½x4½	Gas.	1-2
Boring.....1921	15-30	1850	3	Wauk.	4-4½x6½	Gor K	2	Linn.....HJ	40	4500	4	Cont.	4-4½x6½	Gas.	4	Triumph.....H	18-36	2450	2	Erd.	4-4½x6	Ker.	4
Burn-Oil, 1922	15-30	1495	4	Own	2-6½x7	Ker.	3-4	Little Giant.....B	16-22	2200	4	Wauk.	4-4½x6½	G,K	6	Trumdar.....13	25-40	3750	2	Wauk.	4-5 x6½	Gor K	4
Capital.....	15-30	1000	2	Own	4-4 x6	Gas.	3	Little Giant.....A	26-35	3300	4	Own	4-4½x6	K	4	Turner.....1921	14-25	1295	4	Buda	4-4½x5½	G,K	3
Case.....	10-18	800	4	Own	4-4½x6½	Gor K	2	Lombard.....1921	35-150	.....	2	Own	4-4½x6	K	4	Twin City.....	12-20	1580	4	Own	4-4½x6	G,K	3
Case.....	15-27	1680	4	Own	4-4½x6½	Gor K	3	Lombard.....1921	50	.....	2	.....	4-4½x6	K	4	Twin City.....	20-35	3175	4	Own	4-5½x6½	G,K	5
Case.....	22-40	3100	4	Own	4-5½x6½	Gor K	4-5	Magnet.....B	14-28	1875	4	Wauk.	4-4½x6½	K&G	3	Uncle Sam C20	12-20	1385	4	Own	4-7½x9	G,K	8
Caterpillar T11	25	3975	2	Own	4-4½x6	Gas.	4	Magnet.....B	14-28	1875	4	Wauk.	4-4½x6½	K&G	3	Uncle Sam B19	20-30	2300	4	Weid.	4-4 x5½	G	2-3
Caterpillar T16	40	6050	2	Own	2-4½x6½	Gor K	1	Master Jr.....	5-10	585	.....	LeR.	4-3½x4½	Gas.	1	Uncle Sam D21	20-30	1985	4	Beav.	4-4½x6	Gor K	3-4
Centaur.....	5-2½	385	2	NWay	2-4½x6½	Gor K	1	MerryGar1921	2	230	2	Evin	1-2½x2½	Gas.	1	Universal.....	1-4	475	2	Own	1-3½x5	G	1
Chase.....	12-25	1725	3	Buda	4-4½x5½	Gor K	2-3	Minne.....All-P	12-25	900	4	Own	4-4½x7	Gor K	3-4	Utiliter.....501	2½-4	380	4	Own	1-3½x4½	G	1
Chicago.....40	40	2500	4	Own	4-4½x6	Gas.	4	Minne.....Gen-P	17-30	1675	4	Own	4-4½x7	Gor K	3-4	Victory.....1921	9-18	1350	4	Gray	4-3½x5	Gas.	2
Cletrac.....F	9-16	845	2	Own	4-3½x4½	G,K,D	2	Minne.....	35-70	4150	4	Own	4-7½x9	Gor K	8-9	Victory.....1921	15-30	1750	4	Wauk.	4-4½x5½	Gas.	3
Cletrac.....W	12-20	1495	2	Own	4-4 x6½	G,K,D	2-3	Med.Duty	22-44	3000	4	Own	4-6 x7	Gor K	5-6	Vim.....	15-30	1650	4	Wauk.	4-4½x5½	G,K	3
Dakota.....4	15-27	1500	3	Dom.	4-4½x6	Gas.	3	Minne.....	35-70	4150	4	Own	4-7½x9	Gor K	8-9	Wallis.....K	15-25	1600	4	Own	4-4½x5½	G,K	3
Dart.....B.J.	15-30	1800	4	Buda	4-4½x6	Gas.	3-4	HeavyDuty	8-16	785	2	Light	4-3½x4½	K or G	1-2	Waterloo.....N	12-25	1450	4	Own	2-6½x7	G,K	3
Depue.....A	20-30	2500	4	Buda	4-4½x6	Gas.	4	Mohawk.....1921	9-18	900	2	Own	4-3½x5	Gas.	2-3	Webfoot.....S3	28-53	5000	2	Wisc.	4-5½x7	G,D	0
Dill.....D	20	2380	4	Cont.	4-4½x5½	Gas.	3	Moline Univ.D	9-18	1075	2	Own	4-3½x5	Gas.	2-3	Wellington.....B	12-22	.....	4	Erd	4-4 x6	Ker.	2-3
Dill.....R.W.	20	2980	4	Midw.	4-4½x6	Gas.	3	Moline Orch.	9-18	1075	2	Own	4-3½x5	Gas.	2-3	Wellington.....F	16-30	.....	4	Chief	4-4½x6	Ker.	3-4
Do-It-All.....A	3-6	595	.....	Own	1-4½x5	Gas.	1	Motor Macul.	1½	195	2	Own	1-2½x3½	Gas.	1	Western.....1920	6-32	2100	4	Clim.	4-5 x6½	Gas.	4
Eagle.....F	12-22	.....	4	Own	2-7 x8	Gor K	3-4	Motex.....	15-30	2250	4	Buda	4-4½x6	Gas.	3-4	Wetmore-21-22	12-25	1585	4	Wauk.	4-4 x5½	G,K	3
Eagle.....F	16-30	.....	4	Own	2-8 x8	Gor K	4-5	NB.....1	3-6	425	4	Own	2-3½x4	Gas.	1	Wharton.....W-E	12-20	1800	3	Buda	4-1½x5½	Gas.	2
E-B.....AA	12-20	1445	4	Own	4-4½x5	G,K,D	3	Nichols-Shep.	20-42	3100	4	Own	8 x10	Gor K	3-6	Whitney.....B	6-18	595	4	Own	2-5½x6½	Gas.	2
E-B.....Q	12-20	925	4	Own	4-4½x5	G,K,D	3	Nichols-Shep.	25-50	3460	4	Own	9 x12	Gor K	4-7	Wichita.....T	15-30	2000	4	Beav.	4-4½x6	G,K,D	3
E-B.....	16-32	2080	4	Own	4-5½x7	G,K,D	4	Nichols-Shep.	25-50	3460	4	Own	9 x12	Gor K	4-7	Wisconsin.....F	16-30	2250	4	Wauk.	4-5 x6½	Gor K	3
Evans.....	18-30	2000	4	Buda	4-4½x6	G,K	3	Nichols-Shep.	25-50	3460	4	Own	9 x12	Gor K	4-7	Wisconsin.....F	20-40	2450	4	Wauk.	4-5 x6½	Gor K	3
Fageol.....D	9-12	1525	4	Lyc.	4-3½x5	Gas.	2	Nichols-Shep.	25-50	3460	4	Own	9 x12	Gor K	4-7	Wisconsin.....H	22-40	3200	4	Clim.	4-5½x7	Gor K	4-6
Farm Horse..B	18-30	1885	4	Clim.	4-5 x6½	G,K	3-4	Nilson Senior..	20-40	2475	5	Wauk.	4-5 x6½	G,K	4	Yuba.....12-22	12-20	2600	2	Wisc.	4-4½x6½	G,K,D	3
Farquhar.....	15-25	.....	4	Buda	4-4½x6	G,K,D	3-4	Oil Pull.....K	12-20	1485	4	Own	2-6 x8	K,D	3	Yuba.....15-25	15-25	3100	2	Wisc.	4-4½x6	G,K,D	4
Farquhar.....	18-35	.....	4	Own	4-6 x8	G,K,D	4-5	Oil Pull.....H	16-33	2285	4	Own	2-7 x8½	K,D	4	Yuba.....21-35	22-35	4185	2	Wisc.	4-5½x7	G,K,D	4
Farquhar.....	25-50	.....	4	Own	4-7 x8	G,K,D	6-7	Oil Pull.....G	20-40	3175	4	Own	2-8 x10	K,D	5-6	Yuba.....25-40	25-40	4650	2	Wisc.	4-5½x7	G,K,D	4
Fitch.....4	20-35	.....	4	Clim.	4-5 x6½	Gor K	3-4	Oil Pull.....E	30-60	4500	4	Own	2-10x12	K,D	8-10	Zelle.....	12-25	.....	4	.....	4-4½x5½	Gor K	3
Flour City.....	20-35	.....	4	Own	4-5½x8	Ker.	4-6	Oldsmar GarK	21½-5	335	4	Own	1-5½x5½	Gas.	1								
Flour City.....	30-50	.....	4	Own	4-6½x7	Ker.	6-8	Oliver.....	15-30	.....	2	Beav.											

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

London, Ontario.....	National Motor Show of Western Canada.....	January
New York.....	National Automobile Show.....	Jan. 7-13
New York.....	National Body Builders' Show.....	Jan. 9-14
Buffalo.....	Buffalo Automobile Dealers' Assn.....	Jan. 14-21
Philadelphia.....	Automobile Show.....	Jan. 14-22
Rochester.....	Automobile Show.....	Jan. 16-21
Tulsa, Okla.....	Automobile Show.....	Jan. 16-21
Oakland, Calif.....	Automobile Show.....	Jan. 16-22
Milwaukee.....	Fourteenth Annual Automobile Show.....	Jan. 19-25
San Francisco.....	Automotive Equipment Show.....	Jan. 21-26
San Francisco.....	Automotive Equipment Exposition.....	Jan. 21-27
Cleveland.....	Cleveland Automobile Mfrs. and Dealers' Assn.....	Jan. 21-28
Baltimore.....	Annual Automobile Show.....	Jan. 21-28
Portland, Ore.....	Annual Automobile Show.....	Jan. 23-29
Chicago.....	National Automobile Show.....	Jan. 28-Feb. 3
Chicago.....	Automobile Salon.....	Jan. 28-Feb. 3
Pontiac, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 1-4
Minneapolis.....	Tractor Show.....	Feb. 6-11
Minneapolis.....	Automobile Show.....	Feb. 6-11
Winnipeg, Canada.....	Canadian Automotive Equipment Assn. Show.....	Feb. 6-11
Flint, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 8-11
Kansas City.....	Kansas City Motor Dealers' Assn.....	Feb. 9-16
Atlanta.....	Southern Automobile Show.....	Feb. 11-18
San Francisco.....	Sixth Annual Pacific Automobile Show.....	Feb. 11-18
Kalamazoo, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 14-18
Louisville, Ky.....	Fourteenth Annual Automobile Show.....	Feb. 20-25
Syracuse.....	Fourteenth Annual Automobile Show.....	Feb. 20-25
Grand Rapids, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 20-25
Des Moines.....	Winter Automobile Show.....	Feb. 26-March 3
Springfield, Mass.....	Seventh Annual Automobile Show.....	Feb. 27-March 4
Muskegon, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 27-Mar. 4
Bay City, Mich.....	Michigan Automotive Trade Assn. Show.....	Feb. 28-Mar. 4
Brooklyn.....	Eleventh Annual Show.....	March 4-11
Saginaw, Mich.....	Michigan Automotive Trade Assn. Show.....	Mar. 6-10
Boston.....	Annual Automobile Show.....	March 11-18
Newark, N. J.....	Newark Automobile Dealers' Assn.....	March 11-18
Port Huron, Mich.....	Michigan Automotive Trade Assn. Show.....	Mar. 15-18
Ypsilanti, Mich.....	Michigan Automotive Trade Assn. Show.....	Mar. 21-22
Ann Arbor, Mich.....	Michigan Automotive Trade Assn. Show.....	Mar. 24-25
Benton Harbor, Mich.....	Michigan Automotive Trade Assn. Show.....	Mar. 28-31
Battle Creek, Mich.....	Michigan Automotive Trade Assn. Show.....	Apr. 2-8

FOREIGN SHOWS

Calcutta, India.....	Automobile Show.....	Dec. 19-24
Santiago, Cuba.....	Annual Automobile Show.....	March, 1922
Rio de Janeiro, Brazil.....	Automotive Exhibition.....	September, 1922

CONVENTIONS

Columbus, O.....	Ohio Automotive Trade Assn. Meeting.....	Dec. 12-14
Chicago.....	American Road Builders' Convention and Show.....	Jan. 17-20
Chicago.....	Fifth Annual N. A. D. A. Convention.....	Jan. 30-31

OCTOBER SALES IN CALIFORNIA

San Francisco, Dec. 2—A slow but steady increase in the sales of passenger cars has been manifested throughout northern California during November, even exceeding October, when 4,920 passenger cars were sold in that month of 1921, as compared with 4,469 in October, 1920, an increase of about 451 cars. An interesting fact is that the increase in sales was largest in the medium and high priced cars, rather than a result of greater sale of the lowest-priced automobile. The automobile industry apparently has passed the lowest point of its depression in California, and is once more on the up-grade.

That this feeling is prevalent among the dealers is shown by the increased applications for space in the Pacific Automobile Show, to be held in San Francisco, Feb. 11 to 18, inclusive.

PROTEST TAXES IN CANADA

Victoria, B. C., Dec. 2—Spirited protests were offered before the executive council recently to the proposed increase in motor taxes by a large delegation from Vancouver, Victoria and New Westminster.

A. A. Rose, of the Motor Dealers Association, Vancouver, took the stand that automobiles were necessities and not luxuries, and that owners of motors in British Columbia were already taxed far higher than people in other provinces.

Premier Oliver explained that he was weary of fighting over the taxation question. He did not wish to add to people's burdens, he said, but, as agents of the people, the government had to provide what revenue was needed, and, of course, the public had to pay. Who else was to pay, he wanted to know; and everyone was being taxed as equitably as possible.

Pennsylvania Registrations Total Almost 700,000 Cars

License Fee Increase Is More Than
\$2,000,000 Over Last Year
at This Time

HARRISBURG, Pa., Dec. 2—The automobile division of the State Highway Department has received a record-breaking sum for license fees for the period, namely, \$9,377,401, which is an increase over last year at this time of more than \$2,000,000. Licenses of all sorts issued by the automobile division up to Nov. 10 totaled 1,283,444. The number of passenger cars licensed in the state on that date was 630,108, while the number of commercial cars licensed reached 50,702.

Changes in the classification of trucks with reference to chassis weights, fees and maximum over-all weights allowed, are presented in the following table:

Class	Chassis—Tire Fee— Max.			
	Wt.	Pneu.	Solid	Cap.
AA.....	2000	\$24	\$30	7000
A.....	3000	32	40	11000
B.....	4000	40	50	13000
C.....	5000	56	70	18000
D.....	6000	80	100	22000
E.....	7500	100	125	25000
F.....	8500	140	200	26000

Trucks having chassis weight of less than 2000 lbs. are registered on the basis of horsepower rating, with minimum fee of \$15. A truck-tractor with semi-trailer attachment is registered as one vehicle with fee computed according to table of weight and the fees specified for trucks and upon the basis of the chassis weight of the tractor, plus the weight of the attachment. The fee for registration of any trailer with metal tires is double the regular fee for trailers.

UNIFORM LAW CONFERENCE

San Francisco, Dec. 2—Passenger car and truck dealers of all northern California are preparing to take an extensive part in the important meeting to establish uniform legislation governing the state highways of every state on the Pacific slope, which is to be held in San Francisco in January, date to be announced later. The meeting will be attended by representatives of boards of supervisors from every county in California, Oregon, Washington, Nevada, New Mexico and Arizona, and from a number of counties in other Pacific slope states. A preliminary conference was held in San Diego, Dec. 2.

MOONEY IN EXPORT DIVISION

New York, Dec. 3—Announcement was made today by President duPont of General Motors Corp. that J. D. Mooney, who is now general manager of the Remy Electric division at Anderson, Ind., will be transferred to the General Motors Export Co. as operating vice-president. I. J. Reuter, who is now general superintendent of the Remy Electric division, will succeed Mooney as general manager.